FOUNDRY

APRIL
1957

A PENTON PUBLICATION

How a Foundry Can Recruit Engineers—p. 100

✔ Practical pH Control

Data provide understanding of the effect of pH factor on casting quality — p. 106

✔ Design of Gray Iron Castings

Discussion of considerations that affect gray iron casting design—p. 111

✔ How To Cut Cleaning Costs

Care between molding and pouring can cut cleaning costs — p. 116

✔ Reducing Steel Foundry Scrap

How one foundry keeps its scrap rate below 1.68 per cent — p. 122

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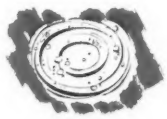
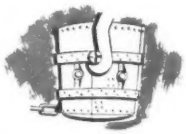
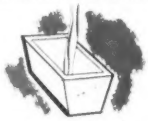
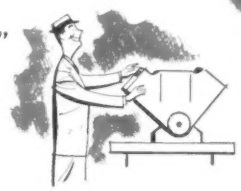
success story of a high quality casting

"I came from very humble beginnings . . . a load of high sulphur scrap picked up at bargain prices and mixed with low-grade coke in the cupola charge.

"But I began to show my metal when

was added to the cupola. It reduced the sulphur content in the melt, checked bridging for better mixing, sped up the combustion reactions. 

"When I graduated to the ladle,  I became even more refined, thanks to PURITE's ability to desulphurize to uniform specifications. I entered the mold as clean, quiet-pouring iron  and cooled to a strong, machineable casting that satisfied the customer's most rigid specifications." 

Effective . . . economical . . . simplicity itself to store and use . . . the 2-pound pigs of non-crumbling PURITE have been proved in use for over 30 years. Next time you contact your foundry supply house, ask about Purite. Or write us today.

PURITE

OLIN MATHIESON CHEMICAL CORPORATION

INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MARYLAND

PURITE® is a trademark

4720

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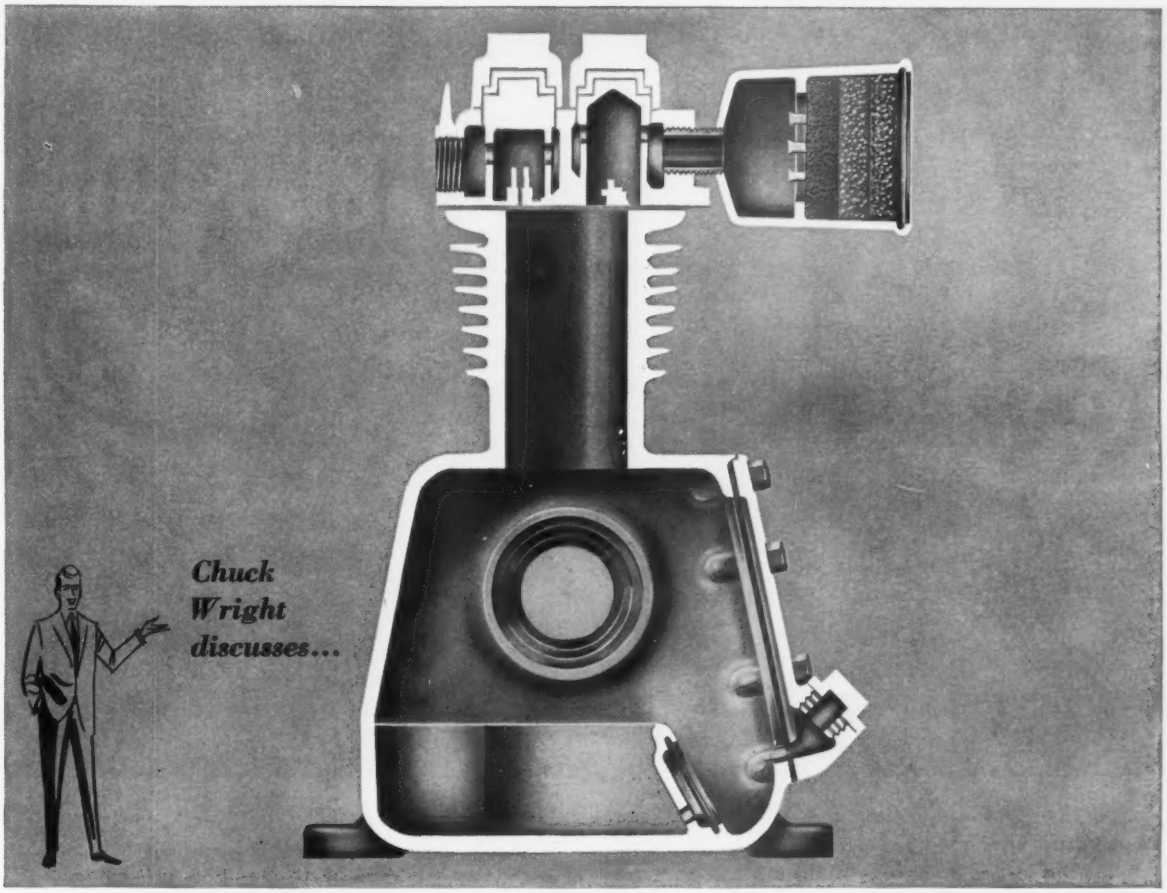

Four ways nickel cast irons help your customers build better compressor cylinders

"Four properties—strength, pressure tightness, wear resistance and machinability—are uppermost in the minds of your customers when they buy compressor cylinder castings. Nickel cast irons best provide these properties.

"First, nickel cast irons have the strength levels needed for really efficient designs, designs that save on space and weight.

"Second, they promote uniform density in both thick and thin sections. This means surefire pressure tightness.

"Third, the addition of nickel to iron increases the hardenability, without danger of chilling the thinner sections. This gives your customer a more wear resistant cylinder.

"Fourth, nickel cast irons are readily machinable making possible higher machining speeds and reduced tool wear.

"And what goes for compressor cylinders goes for valve bodies, pump casings, motor blocks and numerous other heavily-cored castings. Nickel cast irons provide the best combination of strength, pressure-tightness, wear resistance and machinability.

"A wide range of nickel cast iron compositions are available that do as much, and more, for other types of castings.

"For help in selecting the right nickel cast iron for your requirements, get in touch with me through The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y."

Chuck Wright

Foundry Specialist

Nickel Cast Irons: ***Best for you <u>because</u> they're best for your customer***

Considering all the different kinds of sand additives on the market today—it's easy to understand how sand preparation might be quite a problem. But, here are just three additives that have been providing exactly the "right combination" for hundreds of foundries, all over the country. By adding them to sand in varying amounts, all the important sand characteristics can be closely controlled and changed at will, to satisfy specific requirements. They combine to provide more uniform mold hardness, better finish, better shakeout and more readily salable castings. And—common lake, river or beach sand can be used for replacement, without danger of grain size going out of balance. Finally, what's most important—*the cost of these three additives won't exceed $1.00 per ton of castings produced!*

Here's a quick run-down on the characteristics and capabilities of these FEDERAL sand additives:

CROWN HILL SEACOAL

For controlling carbon content. High in volatile, combustible material. Exceptionally low in sulphur content — which means your castings will have more easily-machined surfaces. Produced by FEDERAL at Crown Hill, West Virginia — ground or granulated to properly match the sand used.

FEDERAL GREEN BOND BENTONITE

The only pure, unadulterated, untreated bentonite — with *natural* low viscosity yet high green and dry compression strength. Cuts down on mulling time and permits slurry users to add 25% more bond (bentonite) per gallon of slurry, for strength desired, without strain on pumping system. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites! Mined in Wyoming and South Dakota, processed and guaranteed by FEDERAL.

FEDERAL SAND STABILIZER

For providing greater flowability and better shakeout. A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. Increases sand flowability to permit green strength to be run higher, and to provide better ramming conditions. Attracts moisture to broaden the safe moisture range. Provides better, less lumpy shakeout, without adding other clays to sand mixtures.

It might be very helpful to investigate FEDERAL'S "right combination" — write today for your copy of our sand-preparation booklet—"Tailor-Made Molding Sands".

The **FEDERAL FOUNDRY SUPPLY** Company
4600 EAST 71st STREET, CLEVELAND 5, OHIO
FEDERAL WAREHOUSES—Chicago, Cleveland, Cranston, R. I., Crown Hill, W. Va., Detroit, Los Angeles, Milwaukee, Minneapolis, New York, Richmond, Syracuse, Upton, N.Y.
DEALER STOCKS—Birmingham, Chattanooga, Jacksonville, Oakland, Portland, Ore., Seattle, St. Louis

FOUNDRY
A PENTON PUBLICATION

April 1957
Volume 85—Number 4

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(For addresses of branch offices, see page 289)

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Published monthly by the Penton Publishing Co., Penton Building, Cleveland 13, O. Subscriptions in the United States, possessions and Canada, one year, $5. Single copies, $1. Other countries, one year, $20. Single copies, $2. Accepted as controlled circulation publication at Cleveland, O.
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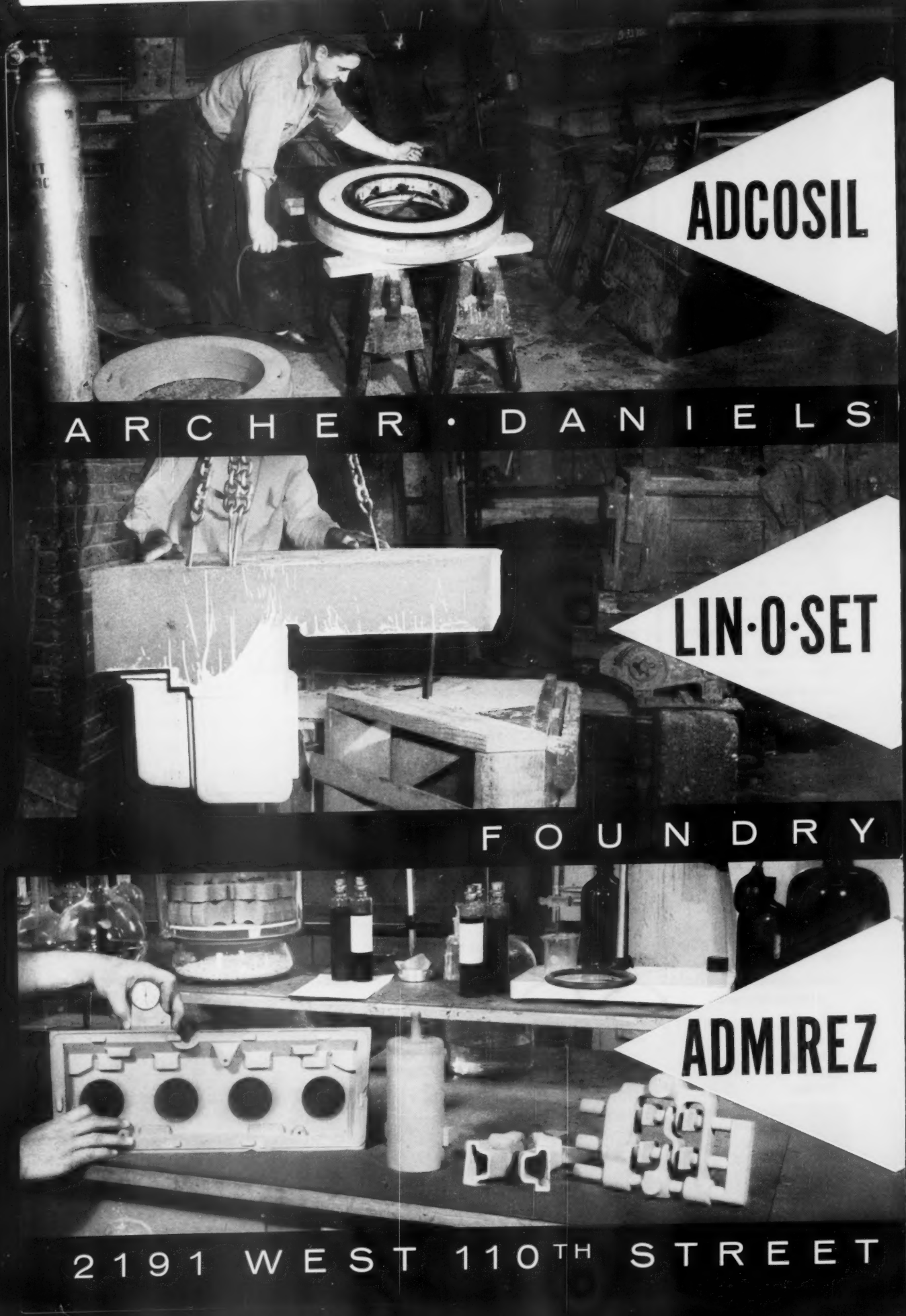

ADCOSIL
ARCHER · DANIELS
LIN·O·SET
FOUNDRY
ADMIREZ
2191 WEST 110TH STREET

BEST FOR CO_2 CORES...

An exclusive feature in ADCOSIL is a color indicator that tells when to stop gassing a CO_2 core. The core mix is tinted a royal purple . . . then fades to a natural sand color when the core is cured throughout.

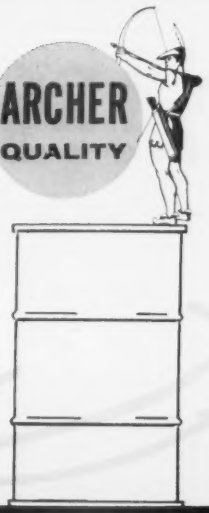
ADCOSIL helps determine where to place core vents and how many to use; helps rig new boxes and patterns; prevents under-gassing, over-gassing; encourages cores designed for most efficient flow of gas; cuts time and costs; saves gas.

Flowability, workability, core hardness, and long bench life are inherent in ADCOSIL sand mixtures.

Several types are available:

For ferrous metals . . . . . ADCOSIL F
For non-ferrous metals . . . . . ADCOSIL NF
For super-collapsibility, all metals. ADCOSIL SC

ASK FOR TRIAL DRUM



ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio
Gentlemen: I am interested in trying:
ADCOSIL F ☐
ADCOSIL NF ☐ } Check One
ADCOSIL SC ☐

Name _____
Title _____
Company _____
Address _____
City _____ *Zone* _____ *State* _____

MIDLAND COMPANY

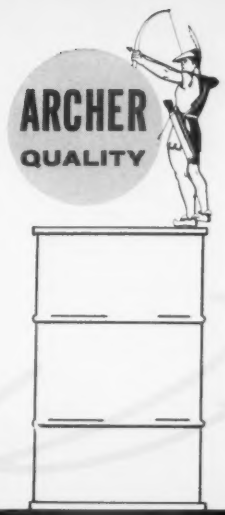
BEST FOR AIR SET CORES...

Original LIN-O-SET, introduced by ADM and praised by large jobbing foundries coast-to-coast, is scarcely a year old. Still, a newer and more phenomenal air-setting binder, LIN-O-SET II, is already available to foundries searching for maximum efficiency.

LIN-O-SET II works in room temperature at exceptional speed hardening the "core of the core" almost as fast as the exposed surfaces. An ADM "first", this development takes the guesswork out of drawing, since the curing of a LIN-O-SET II core combines internal polymerization with surface oxidation.

All this . . . plus the better-known LIN-O-SET features; minimum ramming; saving in cleaning time; thorough collapsibility; elimination of excessive rodding; control of set-up time; improved accuracy; elimination of objectionable odors and toxic gases.

ASK FOR TRIAL DRUM



ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio
Gentlemen: I am interested in trying LIN-O-SET II.

Name _____
Title _____
Company _____
Address _____
City _____ *Zone* _____ *State* _____

PRODUCTS DIVISION

BEST FOR SHELL MOLDS AND SHELL CORES...

ADMIREZ CC-240, newly developed in ADM's Resin Research Laboratory, utilizes a cold coating process. It is a dry powdered product containing a cure catalyst which promotes rapid transformation of the resin from a low-melting-point, alcohol-soluble material to a hard, infusible solid under the influence of heated air.

Two basic improvements are offered by ADMIREZ CC-240 over earlier resins: elimination of sand-resin segregation; reduction of economically prohibitive high resin requirements. Advantages are: fast coating; quick breakdown during mulling; high flowability of coated sand; exceptionally fast cure time; excellent stripping from pattern; high tensile strength and lack of brittleness; low-shell breakage; lack of thermal plasticity.

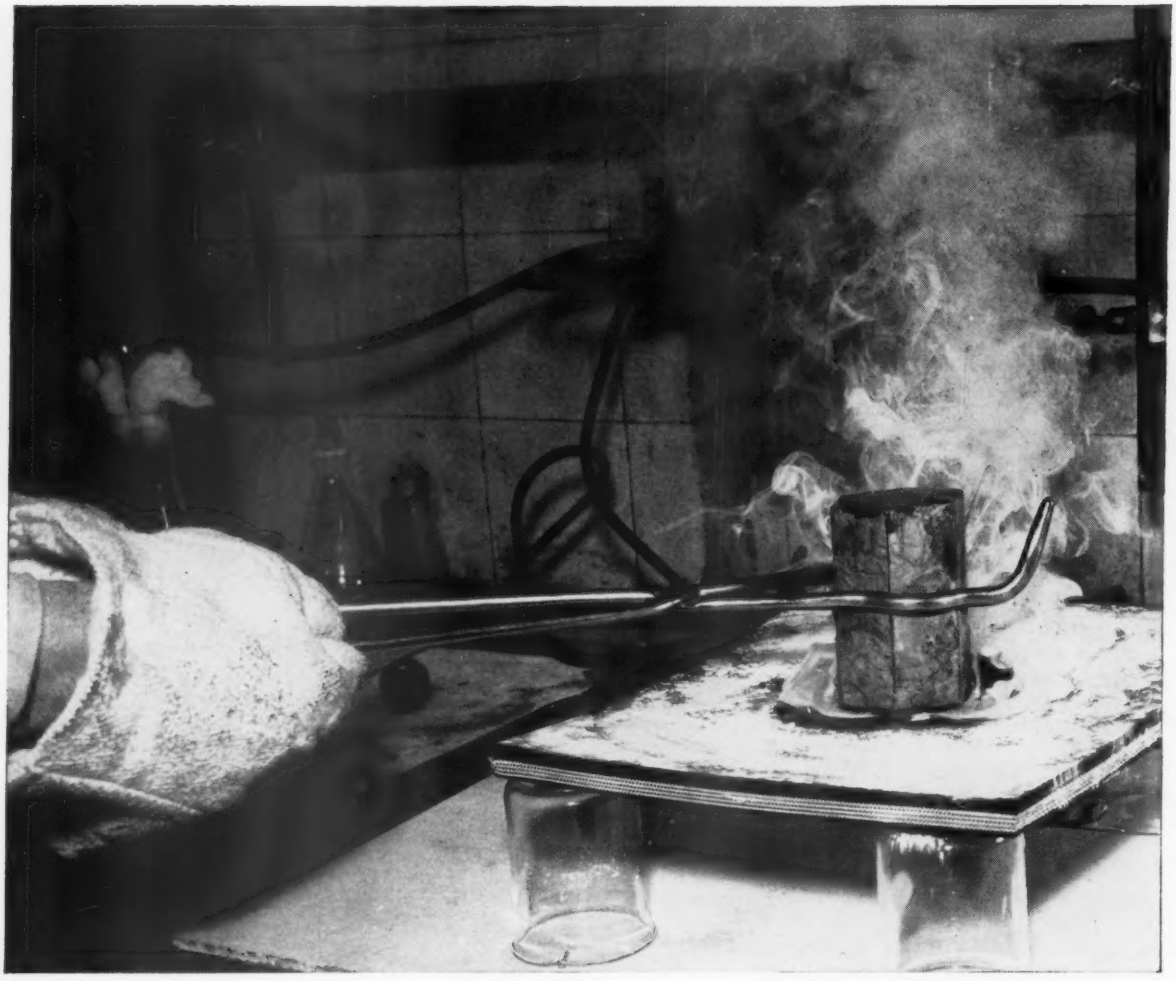
ASK FOR TRIAL DRUM

ARCHER-DANIELS-MIDLAND COMPANY
Foundry Products Division
2191 West 110th Street, Cleveland 2, Ohio
Gentlemen: I am interested in trying ADMIREZ CC-240.

Name _____
Title _____
Company _____
Address _____
City _____ *Zone* _____ *State* _____

CLEVELAND 2, OHIO

B.F.Goodrich



Red-hot metal won't burn through this B.F.Goodrich conveyor belt

New fire curtain means longer life for hot-material belts

SCORCHING chunks of metal that sometimes land on foundry conveyor belts won't burn holes through a B. F. Goodrich conveyor belt with the built-in fire curtain.

This new protective shield is two layers of glass fabric that B. F. Goodrich puts into the top cover of hot-material conveyor belts. If a hot chunk of metal accidentally drops on the belt, the rubber cover chars at the spot, but only down to the glass fabric fire curtain. Since the hot object doesn't penetrate the glass fabric barrier, the belt keeps its strength and so, of course, lasts longer than belts without this protection.

To demonstrate the effectiveness of the fire curtain, tests were run on two hot-material belts. One belt had the B. F. Goodrich fire curtain protection; the other did not. A red-hot steel bar was placed on each belt. It burned through the rubber covers on both belts. And it burned a hole clear through the unprotected belt. But the B. F. Goodrich fire curtain stopped the burning chunk, so that the body of the protected belt was undamaged.

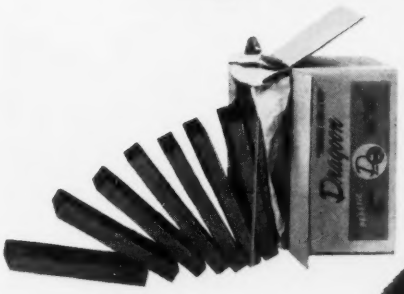
The fire curtain protection is ideal for foundry service where burnt holes are the major cause of short belt life. It can be built into any B. F. Goodrich hot-material belt. Talk it over with a B. F. Goodrich distributor and see if this new belting improvement is the answer to your hot material problems. *B. F. Goodrich Industrial Products Company, Dept. M-905, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

Circle 556 on Inquiry Card—Page 51

Q. How can DRAGOON "carbon fortified" lining materials help you lower maintenance costs . . . improve casting quality?



Dragoon Plastic (Wet). Packed in 100 lb. moisture-proof carton.

Dragoon Plastic (Dry). Packed in 50 lb. and 100 lb. bags.

Dragoon Mortar Coating & Ladle Wash. Packed in 50 lb. and 100 lb. bags.

A. DRAGOON forms a long-lasting, penetration-resistant lining that prevents slagging, bridging, skulling . . . lubricates the flow . . . keeps metal pure . . . castings clean.

Dragoon Plastic (Wet) comes in convenient, ready-to-use slices for hand or air hammer ramming. Forms a solid monolithic lining in cupola wells, breasts, and ladles that will not shrink, crack or erode out. Reduces lining repair . . . promotes cleaner equipment . . . cleaner casting.

Dragoon Plastic (Dry) is mixed with water to any consistency for ramming. It can be rammed in against safety linings to form a solid refractory structure that will not shrink away or spall. It reduces maintenance costs through easy installation . . . long service life. It's an ideal product for gunning in production shops.

Dragoon Mortar Coating and Ladle Wash is mixed with water for spraying or brushing on over existing linings. It forms an impermeable coating for lubrication and slag resistance.The Dragoon product will pay off by eliminating liner repairs when used as a wash coat for ladles and cupola spouts.

DRAGOON CARBON CUPOLA BLOCK resists slagging, penetration, abrasion . . . outlasts other refractory block 5 to 1. Is ideal for production shops with long heats.

DRAGOON Carbon Block available in all standard cupola blocks and special sizes.

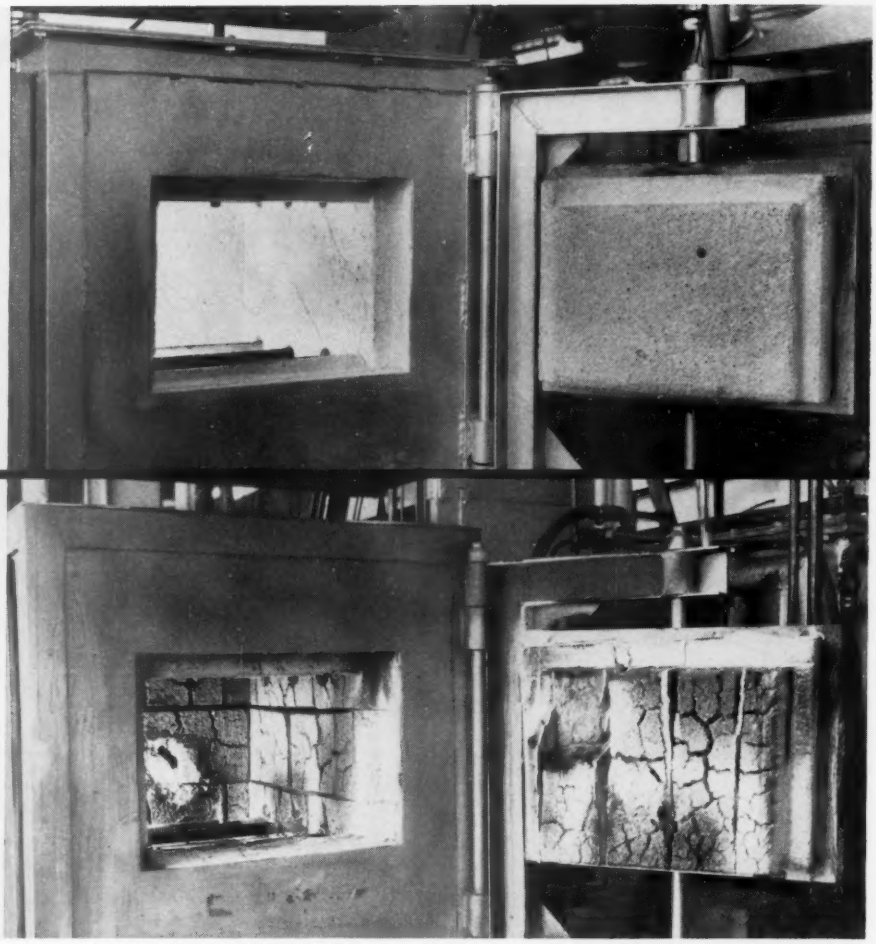
This exclusively formulated, carbon fortified block will give superior service in cupola wells, spouts and ladle linings. Heat of the molten metal forms a fused surface on the hot face of the block, entrapping the carbon and preventing oxidation. This tough shell resists abrasion and penetration, yet allows carbon to come through, lubricating each heat. The result is extended service life . . . cleaner, easier casting.

TEST DRAGOON PRODUCTS under your own conditions and prove their superior workability and service features. Write for complete information.

Dragoon

is a product of SIVAD CERAMIC CORPORATION, Oak Hill, Ohio

Associated Companies: The Davis Fire Brick Co., The Ohio Fire Brick Co., The Cambria Clay Products Co.



LINED WITH ALUNDUM 33-I CASTABLE, this furnace has been used for almost a year as a periodic furnace for high-temperature laboratory test work. During this time the door was opened and closed over a thousand times with the furnace at temperature. Even after this rugged service, the ALUNDUM Castable lining shows hardly any signs of wear.

LINED WITH A COMPETITIVE HIGH GRADE INSULATING BRICK, this similar furnace was used in the same service for an equal length of time. Under equally severe thermal shock conditions the lining cracked and spalled and this furnace must be rebuilt.

You get higher temperature protection with ALUNDUM* castables

Up to 3300° F!

ALUNDUM 33-I Insulating Castable is made up primarily of countless tiny, pure aluminum oxide bubbles. Forming a network of air spaces it provides excellent insulation, even at the highest commercial temperatures.

ALUNDUM 33-HD Heavy Duty Castable is chiefly composed of dense grains of pure aluminum oxide. It is recommended for forming dense monolithic surfaces in constructing many types of furnaces where high temperature conditions are more severe.

Both ALUNDUM 33-I and 33-HD Castables protect at temperatures up to 3300° F and are very easy to mix and use. You can cast simple or complex shapes with them quickly and inexpensively for many installations and replace more expensive pre-fired shapes.

See your Norton Representative for more facts on how these new Castables can provide long, trouble-free service that saves you time and money. Ask him for the folder *Two New Norton Castables*, or write for your free copy to NORTON COMPANY, Refractories Division, 303 New Bond Street, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

REFRACTORIES

Engineered... Rx ...Prescribed

Making better products... to make your products better

NORTON PRODUCTS:
Refractories • Abrasives
Grinding Wheels • Grinding Machines
BEHR-MANNING DIVISION PRODUCTS:
Coated Abrasives • Sharpening Stones
Behr-cat Tapes

Circle 558 on Inquiry Card—Page 51

...new yardstick for measuring profits!

Towmotor Mass-Handling – moving more units faster, at lower cost – can well be the investment that promises greatest improvement in your future profits, as you face continually rising costs and a shrinking manpower pool.

Integrating Towmotor lift trucks in your departmental operations lets you *supplement* your personnel without adding to your payroll. Enables your men to do a bigger day's work *easier*. Sends them home *fresher*. Permits each one to handle jobs you'd pay a *crew* to do!

Have you seen the new Towmotor lift trucks lately? They offer a wealth of "first-time" features such as:

- Fatigue-free adjustable seating
- Motion-saving "centralized control"
- Maximum free lift that tops all
- No-loss hydraulic lifting action
- Power steering that saves 80% of operator's efforts

Get Bulletin SP-23 on new Towmotor lift trucks from Towmotor Corporation, Cleveland 10, Ohio.

Leaders for 38 years in building Fork Lift Trucks and Tractors

TOWMOTOR – GERLINGER
THE ONE-MAN-GANG

Gerlinger Carrier Company, Dallas, Oregon, is a subsidiary of Towmotor Corporation, Cleveland, Ohio

Circle 559 on Inquiry Card—Page 51

1500-lb. SHOCK LOADS HIT THIS IMPERIAL BELT

Every 5 minutes, a 1500-lb. load of hot carbon pitch mix is dumped on this Imperial Standard Sahara Impregnation 935 Innerlocked Conveyor Belt. Temperatures of the mix are 285° to 300° F.

Since 1948 this belt (102' long by 30" wide x 6 ply) has been in operation 9 hours a day, 5 days a week in the Speer Carbon Co. plant, giving excellent service throughout its life.

JOB-DESIGNED BELTING

Imperial Belting lasts longer in severe service like this because of its INNERLOCKED* construction, an exclusive Imperial stitching process . . . and the special impregnating compounds developed by Imperial.

Imperial Belts are job-designed to give you lowest ultimate belt cost and highest day-to-day operating satisfaction. Ask for case histories.

**Reg. trademark of Imperial Belting Co.*

Write for FREE new catalog and engineering handbook

Valuable guide for every user of conveyor, elevator and power transmission belting.

You expect more from Imperial . . . and you get more!

Imperial BELTING CO.

1755 S. Kilbourn Ave., Chicago 23, Ill.

Circle 560 on Inquiry Card—Page 51

With the Editors

SELL MORE CASTINGS: Although the editors are knee deep in getting the April issue to press, they have been pushing hard on the special feature "Foundries Can Sell More Castings" which will appear in the May, AFS Preconvention issue. I believe that it will be a most interesting and helpful series of articles for the entire foundry industry.

Managing editor Bill Gude introduces the series by showing how a growing population and expanding economy provides the potentials for an increase in the market for castings. The second part of the series tells how "Modern Methods and Materials Can Boost Castings Sales," and is divided into three sections. Associate editor Bob Herrmann discusses the value in new and improved practices in furthering sales; associate editor Ken Mountain explains the value of more exacting controls as a marketing tool and metlurgical editor Ed Bremer reports on the greater field for castings sales produced by new materials and alloys.

In the third section of the series, associate editor Jack Miske tells how "Research and Product Development Creates New Markets." This discussion will describe some of the interesting work being done by trade associations.

A real, down-to-earth presentation for every foundry is provided in the fourth section entitled "How To Build a Marketing Program." The section has been prepared by Dick C. Meloy, marketing director, Gray Iron Founders' Society. The final section is a case study telling how the Northern Malleable Iron Co. utilizes the various ramifications of a good marketing program to sell castings. It was prepared by Don Fulton, Tom Kirby and John Entenmann of that company.

All of this provides an extensive series that you will not want to miss.

—o—

Influencing Lives: A very nice letter from Frank M. Robbins, who recently retired as president of Ross-Meehan Foundries, Chattanooga, had the following paragraph:

"I recently was thinking about you and your publication. It was in the spring of 1918 when I was with a foundry in Indiana and read an ad in your 'Help Wanted' columns for a man to fill out as assistant manager in a plant located in the South. I answered the advertisement, which put me in contact with Gus Meehan and resulted in my moving to Chattanooga and taking the job. I just want to say thanks to your publication for its part in this event."

Sometimes I wonder just how many lives have been influenced by the material that has been published in FOUNDRY since John A. Penton started it back in September of 1892.

—o—

A Notable Record: Few men have the privilege of being connected with the management of an important American industrial company for 65 years. Franklin G. Smith, chairman of the board of the Osborn Mfg. Co., Cleveland, and still active in the affairs of that company, is one of the favored few.

In 1892 Mr. Smith acquired the

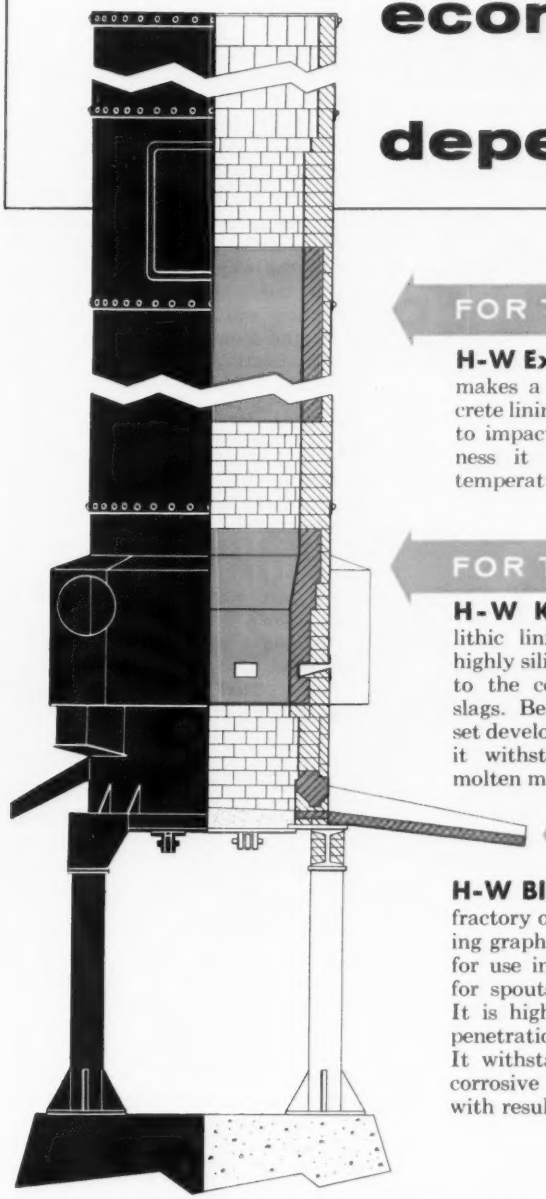
Osborn company, a small operation employing one foreman, two men, two girls and three boys, and became its president. For the next 50 years he headed the company, which grew to become one of the leading manufacturers of foundry equipment and one of the largest manufacturers of power-driven brushes. The foundry division was established in 1908. Over the years Mr. Smith also has been interested in the activities of groups in the foundry industry. He was the second president of the Foundry Equipment Manufacturers Association, serving two terms in 1922 and 1923, and he was a director of the American Foundrymen's Society from 1932 to 1935.

At a recent luncheon commemorating Mr. Smith's 65th anniversary as founder of the company, Norman F. Smith, president of the company, presented a check for $10,000 to Dr. A. Blair Knapp, president of Dension University, for the establishment of

Harbison-Walker *Monolithic* cupola linings

economical to install and maintain...

dependable in service...



FOR THE CHARGING ZONE

H-W Extra Strength Castable makes a hard, strong refractory concrete lining which is extremely resistant to impact and abrasion. In refractoriness it is adequate for service at temperatures up to 2400°F.

FOR THE MELTING ZONE

H-W Kuplomix provides monolithic linings free from joints. It is highly siliceous and extremely resistant to the corrosive action of non-basic slags. Because of the strong ceramic set developed at working temperatures, it withstands the erosive action of molten metal and slag to a high degree.

FOR THE BOTTOM ZONE

H-W Black Patch is a plastic refractory of super-duty quality containing graphite, which is especially suited for use in the cupola breast wall and for spouts, runners and ladle linings. It is highly resistant to wetting and penetration by molten iron and slags. It withstands the severe erosive and corrosive action of metals and slags with resultant longer service life.

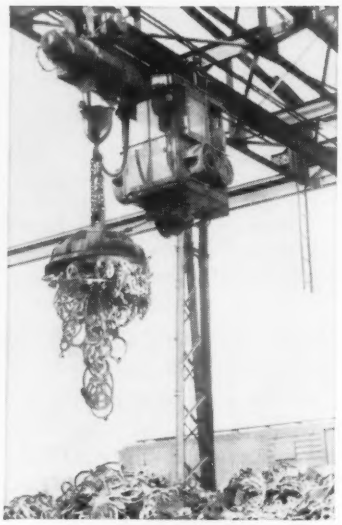
In addition to the above, Harbison-Walker products include all classes of commercial refractories for every foundry requirement.

HARBISON-WALKER REFRACTORIES CO.
AND SUBSIDIARIES
World's Largest Producer of Refractories
GENERAL OFFICES: PITTSBURGH 22, PENNA.

WHICH HOIST
fits your plant's needs?

SHEPARD NILES
FLOOR-OPERATED HOIST

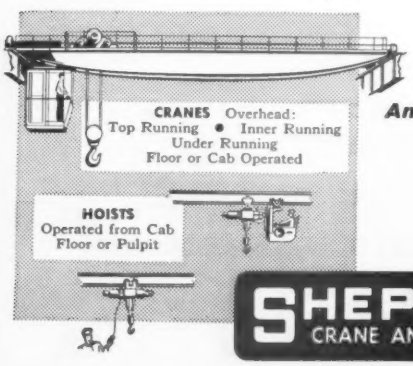
Operator primarily occupied with other duties. Uses hoist for fast, efficient handling of relatively short hauls.



SHEPARD NILES
CAB-OPERATED HOIST

Operator in cab moves loads along at high speeds, occupies best vantage point for spotting and stacking material.

THE RIGHT HOIST . . . can reduce your plant's handling costs. But which one is best for the job . . . a floor-operated hoist where the operator is freed for other duties or a cab-operated hoist where he is engaged fulltime moving loads through the air? Because Shepard Niles manufactures both types of hoists . . . as well as a complete line of cranes . . . we can approach your handling problem with an open mind.



● Send for Bulletins describing Shepard Niles Cab and Floor-Operated Hoists. And request our representative to call.

America's Most Complete Line

of Cranes and Hoists

Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION

1388 Schuyler Ave., Montour Falls, N.Y.

the Franklin G. Smith Scholarship Fund at the institution. The illustration shows Chairman Smith (left) looking on while President Smith (center) delivers the check to President Knapp.

Congratulations to Franklin G. Smith for a wonderful record of accomplishment and to Osborn Mfg. Co. for establishing the scholarship fund.

—o—

An Artist Comments: Recently Jon Rogers, an artist down Florida way who provides cartoons for FOUNDRY, sent along the following comment with a batch of finished cartoons:

"By the way, I would like to add a few thousand thanks for the fine education you folks are giving me about the foundry industry . . . and the fascinating business it is. In fact, the idea for the gag about the copy of FOUNDRY popped into my head as I was sitting here thinking how a man who knew his foundry business, armed with a steady flow of FOUNDRY know-how could never be stumped for long by any trade problem he might encounter. It would be interesting to know just who first had the brilliant idea of putting together a trade magazine."

Thanks, Jon, for the kind comments. That cartoon appears on page 254 of this issue.

—o—

Tell the Press: The need for a better public relations job with the personnel of our metropolitan press again is emphasized. Recently the *Milwaukee Journal* carried a two-column heading, "Foundry Hammers Getting Earthquake Test by City." The story began: "The city began Monday to keep a scientific check on the vibrations produced in the neighborhood by the hammers of a southside foundry."

Further on it indicates that the vibrations are reported to be caused by the Milwaukee Forge & Machine Co., which, of course, is not a foundry. The motto seems to be—Whenever something needs correcting, blame it on a foundry.

—o—

Don't Believe It: A headline in a recent issue of a financial newspaper of national distribution would leave the impression the foundry industry is in bad shape.

Don't believe it! Business is spotty with some plants working short weeks. But a sizable section of the industry is doing well. Production may not be too far behind that of 1956, when the third highest yearly total in history was recorded.

—F.G.S.

Circle 562 on Inquiry Card—Page 51

Looking for Cleaner Metals?

The Answer is SOFFEL'S NON-FERROUS FLUXES

BB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorous oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces—prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—For use in bottom of pouring ladles or open flame furnaces to absorb liquid slag and keep the furnace and ladle linings clean.

BRASS ALUMINUM REMOVER—Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

ALUMINUM BRONZE FLUX—A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity castings—removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys—removes gas and oxide and increases fluidity.

KLEN ZINC FLUX—A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings—will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings—adds longer life to molds. Produces clean gas free castings.

POT COATING—For iron pot melting—increases life of pots. Prevents iron pick up.

Our years of experience in serving the needs of practical foundrymen have demonstrated that fluxes in powder form give a quicker, cleaner action than any other form.

Ask Your Nearest PMP CO. Distributor for Samples

UNITED STATES:

ARLINGTON 74, MASSACHUSETTS
Malcolm G. Stevens
78 Summer St.
PHONE: MI 8-4112 · 8-4113

BIRMINGHAM, ALABAMA
Foundry Service Company
2321-2329—29th Ave., No.
PHONE: Birmingham 4-4754

BOSTON 11, MASSACHUSETTS
Klein-Farris Co., Inc.
683 Atlantic Ave.
PHONE: Hancock 6-1210

BUFFALO 12, NEW YORK
Frederic B. Stevens, Inc.
93 Stone St.
PHONE: Taylor 2091

DETROIT 16, MICHIGAN
Frederic B. Stevens, Inc.
1800—18th St.
PHONE: Tashmoo 5-0725

EDWARDSVILLE, ILLINOIS
Midwest Foundry Supply Co.
270 W. Union St.
PHONE: Edwardsville 76

HOUSTON 2, TEXAS
Eltex Chemical Company
1803 Dallas Ave.
PHONE: Fairfax 3-3262

INDIANAPOLIS 7, INDIANA
Frederic B. Stevens, Inc.
4000 East 16th St.
PHONE: Fleetwood 7-8302

KANSAS CITY 2, KANSAS
Lloyd Canfield Foundry Supplies
Inter-State Storage Bldg., 1721 Minnesota Ave.
PHONE: Drexel 1-0034

LOS ANGELES 22, CALIFORNIA
Pacific Graphite Co., Inc.
2522 Malt Ave.
PHONE: Raymond 3-5215

MILWAUKEE 14, WISCONSIN
Milwaukee Chaplet & Supply Corp.
8656 W. National Ave.
PHONE: Spring 1-1111

MINNEAPOLIS 14, MINNESOTA
Smith-Sharpe Company
117—27th Ave., S.E.
PHONE: Franklin 1-1345 · Franklin 1-2156

NEW HAVEN 11, CONNECTICUT
Frederic B. Stevens, Inc.
168 Brewery St.
PHONE: University 5-0501

OAKLAND 8, CALIFORNIA
Pacific Graphite Co., Inc.
40th & Linden Sts.
PHONE: Olympic 8-3300

PHILADELPHIA 49, PENNSYLVANIA
Robert G. Dyer Company
6929 Sylvester St.
PHONE: Fidelity 2-1154

PORTLAND 1, OREGON
LaGrand Industrial Supply Co.
15 S.W. Arthur St.
PHONE: Capitol 7-3683

SEATTLE 4, WASHINGTON
Carl F. Miller & Co., Inc.
2450 Sixth Ave., So.
PHONE: Seneca 6668

WEBSTER GROVES 19, MISSOURI
Walter A. Zeis
2 Armin St.
PHONE: Woodland 1-5097

CANADA:

TORONTO 3, ONTARIO
Canadian Hanson & Van Winkle Co., Ltd.
Silver & Morrow Aves.
PHONE: Kenwood 1136

TORONTO 10, ONTARIO
C. C. MacDonald
1723 Dufferin St.
PHONE: Kenwood 1703

VANCOUVER, B. C.
Overseas Commodities, Ltd.
750 Industrial Ave.
PHONE: Tatlow 8531

VANCOUVER, B. C.
Shanahan's Ltd.
1050 Glen Drive
PHONE: Pacific 3101

PITTSBURGH METALS PURIFYING CO., Inc.
1352 Marvista St., N. S. Pittsburgh 12, Pa.

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

an ounce of prevention!

It pays to periodically check the "health" of your blast-cleaning operation to prevent costs from creeping up. You may not be doing as well as say, a year ago. A check on abrasive prices (some have increased more than others), on abrasive consumption, on tonnage cleaned and on cost of replacement parts, will tell.

Such a check is easy to make using simple forms we supply. A sample set will be sent you on request.

One thing sure — if your operation is "ailing," Malleabrasive will cure, as it has in hundreds of other plants.

Competent service personnel available without obligation.

Sold by Pangborn Corporation, and by leading distributors of foundry supplies from coast to coast.

MALLEABRASIVE

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO ®

1907—Fiftieth Anniversary—1957

CALENDAR of Meetings

Apr. 8-10—American Institute of Mining, Metallurgical and Petroleum Engineers, open hearth, steel and blast furnace, coke oven and raw materials conference, Penn-Sheraton Hotel, Pittsburgh.

Apr. 10-11—Malleable Founders' Society, market development conference, Edgewater Beach Hotel, Chicago.

Apr. 12-13—East Coast Regional Conference, sponsored by Metropolitan, Chesapeake and Philadelphia chapters, AFS, Benjamin Franklin Hotel, Philadelphia.

Apr. 29-May 3—Seventh National Materials Handling Exposition, Convention Hall, Philadelphia.

Apr. 30-May 1-2—Investment Casting Institute, annual spring meet.ng, Sheraton Park Hotel, Washington.

May 6-10—American Foundrymen's Society, 61st annual convention and 1st Engineering Castings exhibit, Cincinnati.

May 8-9—Non Ferrous Founders' Society, annual meeting, Netherland Hilton Hotel, Cincinnati.

May 19-22—Industrial Heating Equipment Association, spring meeting, Homestead, Hot Springs, Va.

May 20-23—Design Engineering Show, Coliseum, New York City.

June 10-11—Magnesium Association, summer meeting, Homestead, Hot Springs, Va.

June 11-13—Western Plant Maintenance and Engineering Show, Civic Auditorium, San Francisco.

June 13-14—Malleable Founders' Society, annual meeting, Broadmoor, Colorado Springs, Colo.

June 16-21—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N.J.

June 20-21—American Foundrymen's Society, 2nd annual foundry instructors' seminar, Kellogg Center, Michigan State University, East Lansing, Mich.

June 20-22—Penn State Foundry Conference, sponsored by Pennsylvania State University in co-operation with AFS chapters in New York and Pennsylvania and several independent foundry groups. Pennsylvania State University, University Park, Pa.

June 23-25—Alloy Casting Institute, annual meeting, Homestead, Hot Springs, Va.

June 27-28—Refractories Institute, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Sept. 17-20—American Die Casting Institute, annual meeting, Edgewater Beach Hotel, Chicago.

Sept. 23-24—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 26-28—Missouri Valley Regional Conference, sponsored by St. Louis, Tri-State and Mo-Kan chapters, AFS, and Missouri School of Mines Student Chapter, Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 3-4 — Michigan Foundry Conference, sponsored by Central Michigan, Detroit, Saginaw Valley and Western Michigan chapters, AFS, in co-operation with Michigan State University and University of Michigan. Kellogg Center, Michigan State University, East Lansing, Mich.

Oct. 9-11—Gray Iron Founders' Society, annual meeting, Drake Hotel, Chicago.

Oct. 12-15—Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 17-18—Magnesium Association, annual convention, Biltmore Hotel, New York.

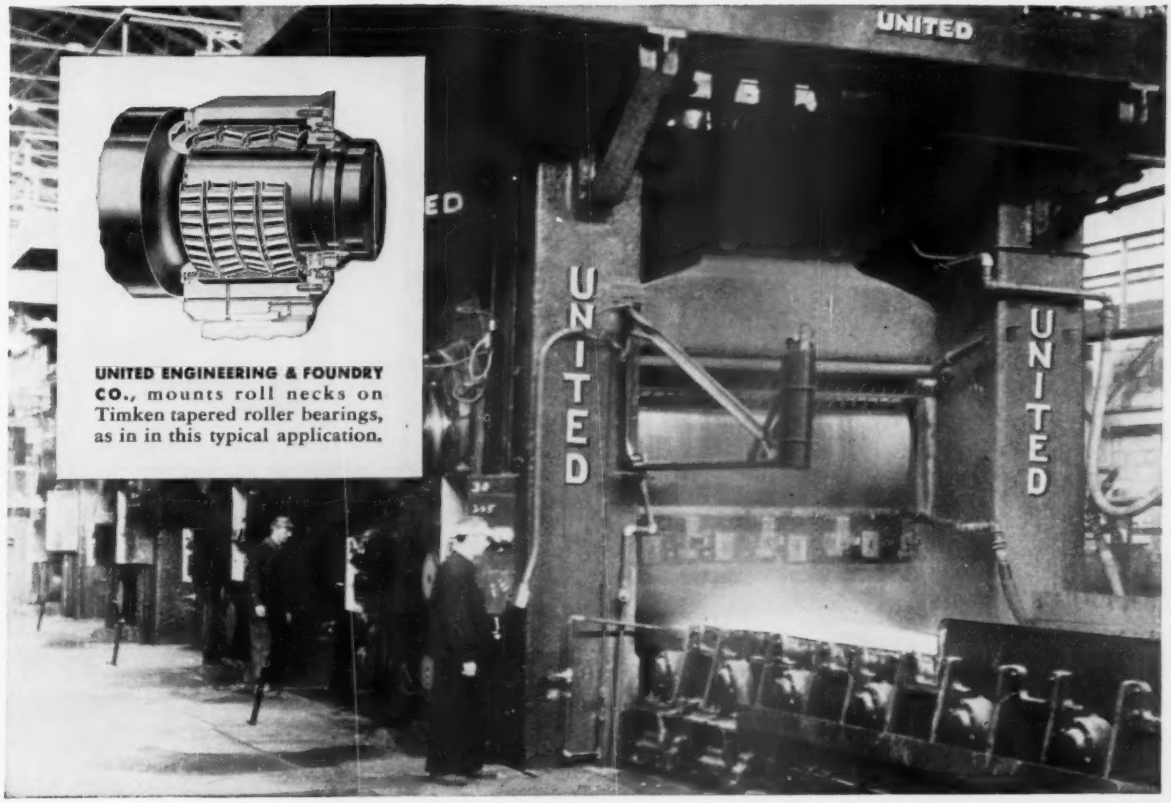
Oct. 17-19—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 21-25—National Safety Council, national safety congress and exposition, Conrad Hilton Hotel, Chicago.

Nov. 4-8—American Society for Metals, national metals exposition and congress, International Amphitheatre, Chicago.

Nov. 7-8—National Foundry Association, annual meeting, Waldorf-Astoria Hotel, New York.

Nov. 11-13—Steel Founders' Society of America, technical and operating conference, Hotel Carter, Cleveland.


UNITED
UNITED
UNITED
UNITED ENGINEERING & FOUNDRY CO., mounts roll necks on Timken tapered roller bearings, as in in this typical application.

Another record! TIMKEN® bearings on this plate mill have rolled 9 million tons of steel

THIS 100"4-stand continuous plate mill — built by United Engineering — went into service at U. S. Steel's Homestead Works in 1936. Some of the Timken® tapered roller bearings on work rolls and back-up rolls have now rolled 9 million tons of steel—all 31 Timken bearings in the mill have rolled an average 5 million tons.

One big reason for this record is the fact that Timken bearings practically eliminate friction. They're geometrically designed and precision-made for true rolling motion. Timken bearings offer low frictional resistance. Higher rolling speeds are possible. Acceleration is easier. There's less skidding and scuffing between rolls. Less repair and maintenance.

By holding rolls rigid, Timken bearings help insure "on-gauge" operation, reduce scrap loss. And by holding shafts and housings concentric, Timken bearings make closures more effective, reduce lubricant leakage. Cut lubricant cost. Grease-lubricated Timken bearings require no tubes, pipes or reservoirs—cut lubrication system maintenance. No extra thrust devices are needed—the tapered construction of Timken bearings lets them take radial and thrust loads. Chuck mountings are more compact. Mill design is simplified.

Tonnage records indicate that the long life of Timken bearings keeps bearing cost per ton of steel rolled to a minimum. And prolonged roll life is assured because Timken bearings provide maximum roll neck strength, less wear. Mills using balanced proportion Timken roll neck bearings increase roll neck strength up to 60%—load ratings up to 40%. The balanced proportion design permits larger diameter roll necks without increasing bearing O.D.—maximum capacity in less space.

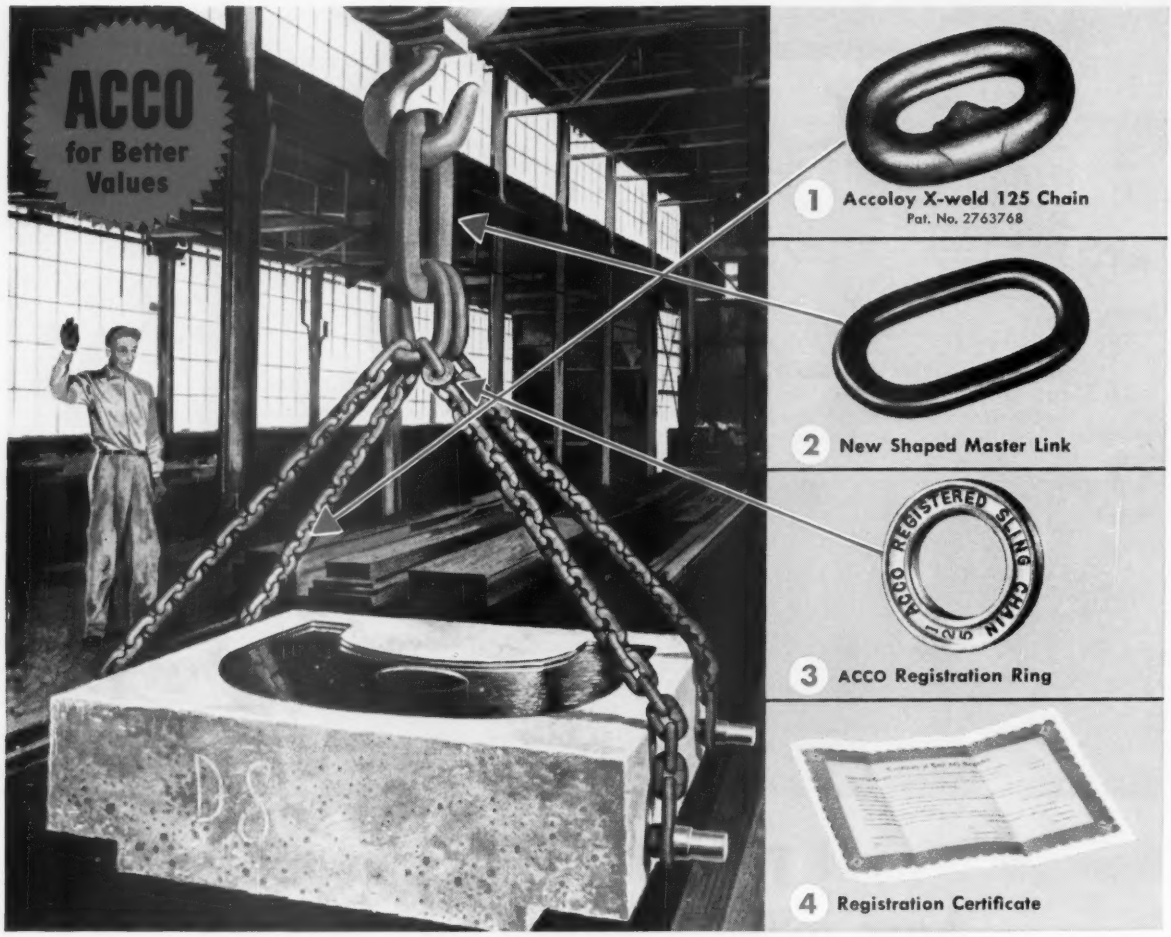
For lowest cost per ton of steel rolled, look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD



You get all these "plus values" in Acco Registered® Sling Chains

• When you equip your plant with ACCO *Registered* Sling Chains, you are getting slings of such *proved safety and efficiency* that they are the standard by which all other slings are judged! And, in addition, you get all these important, exclusive "plus values":

1 Accoloy X-weld 125 Chain • Where extra strength is desired in an ACCO *Registered* Sling Chain, the patented new Accoloy X-weld 125 Chain is used. Its king-sized welded area and non-kinking feature assure greater ruggedness and better service at no increase in price.

2 New Shaped Master Link • ACCO engineers have created the new Shaped Master Link which, without any increase in weight, holds its form under loads up to 18% greater than a standard round section can. This means extra security for your loads.

3 ACCO Registration Ring • The presence of this serially-numbered ring on an ACCO *Registered* Sling Chain shows that each component has been tested before assembly . . . that the assembled sling has been proof-tested to twice its working load limit . . . and that all tests have been successfully passed before registration of the complete sling and shipment from the factory.

4 ACCO Registration Certificate Every buyer of an ACCO *Registered* Sling Chain is furnished with a Registration Certificate signed by American Chain & Cable Company, Inc. This Certificate gives assurance that the sling meets ACCO's severe requirements of quality and proof-tested performance, and that it has been individually registered on ACCO's permanent records.

Tops in safety and strength

ACCO *Registered* Slings, with *Magnaflux-tested hooks*, give the best in strength, safety, service—and long-range economy. They are available through ACCO *Registered* Sling Chain Distributors in principal industrial centers. For full data, write us at York, Pa.

WHAT "ACCO REGISTERED" MEANS

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

American Chain Division
AMERICAN CHAIN & CABLE
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

ACCO
TRADE MARK

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, *New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

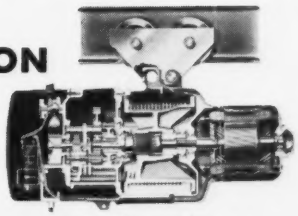
Circle 594 on Inquiry Card—Page 51

Circle 595 on Inquiry Card→

WRIGHT Electric Hoists / for lowest final cost

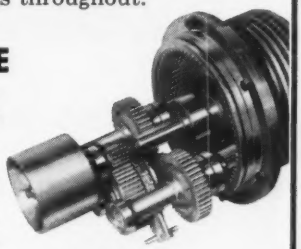
These features make WRIGHT Speedway Hoists your best buy for—

MORE PRODUCTION



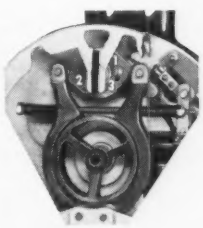
Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

LONGER LIFE



Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

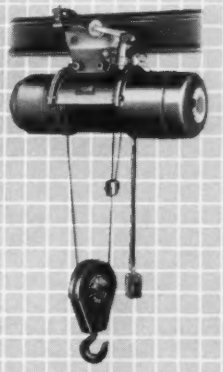
EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

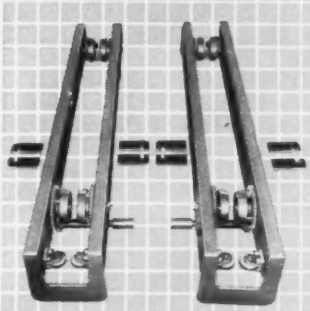
Better performance at lower cost by using WRIGHT units for local-built cranes

SPEEDWAY ELECTRIC HOIST



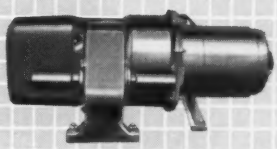
Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

END TRUCKS



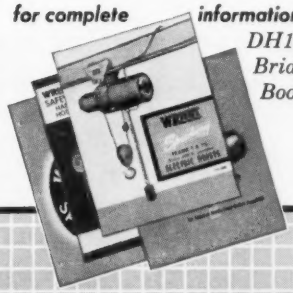
For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

CRANE DRIVE UNIT



Designed for crane and double-beam trolley propulsion. WRIGHT Crane Drive Unit consists of an electric motor with a fluid coupling transmitting power to a well proportioned gear reduction. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

for complete information on WRIGHT Hoists and Crane components ask for: **Speedway Hoists:** *(Frame 1) Booklet DH133B, (Frame 2 & 3) Catalog E55A.* **Motor Driven Cranes:** *Underhung, Single Bridge, Bulletin #227; Top Running, Bulletins #DH448 or DH449* • **Crane Drive Units:** *Booklet DH-431A* • **Hand Traveling Cranes:** *Bulletins #DH-468 and #DH-348B*

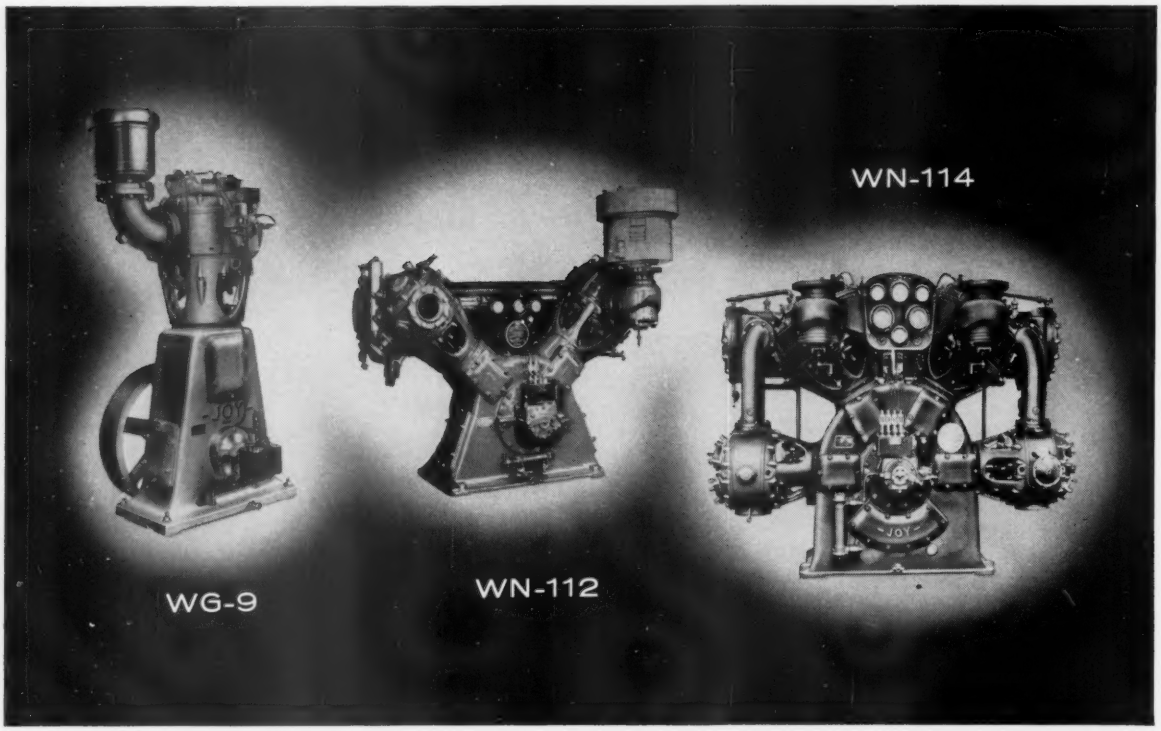


ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Better Value



NEED TO *Expand* YOUR COMPRESSED AIR FACILITIES?

WRITE FOR THESE FREE BULLETINS ON JOY COMPRESSORS

JOY WG-9 • 15 to 75 Horsepower • 95.6 to 939 CFM

Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

JOY WN-114 • 175 to 600 Horsepower • 1186 to 3896 CFM

Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

EQUIPMENT FOR INDUSTRIAL PLANTS...FOR ALL INDUSTRY

WRITE FOR BULLETIN SET 156-13

AIR & GAS COMPRESSORS

FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

WSW 16471-156

Circle 567 on Inquiry Card—Page 51

Circle 568 on Inquiry Card→

Exclusive with the Heroult:

Operating Mechanism Independently Supported

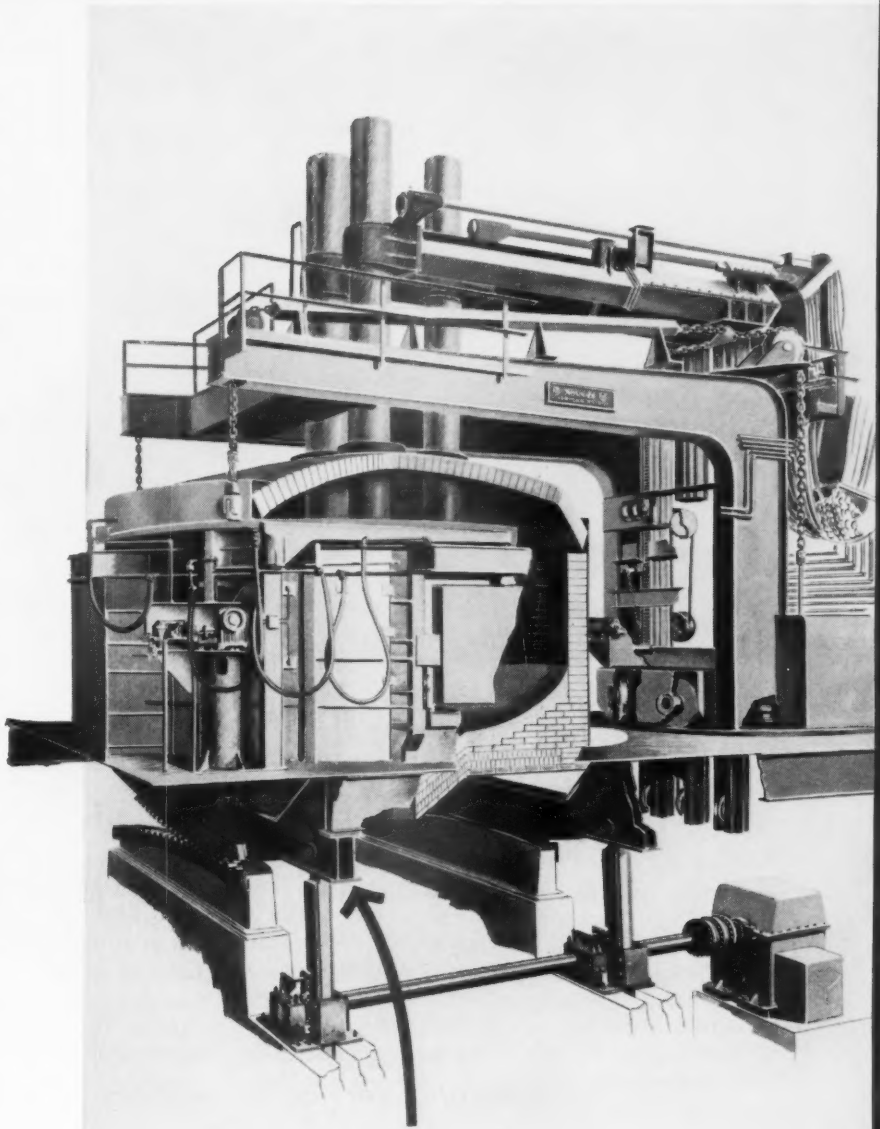
In Heroult's specially designed **new** furnaces the operating mechanism is located on the tilting platform, supported on rockers completely separate from the cage shell. In the event of shell warpage due to overheating, the mechanism remains unaffected and efficient production continues free from maintenance delays.

The independently supported operating mechanism which contributes to lower operating costs, and helps cut maintenance outlays to a fraction of former rates, is only one of the advanced design exclusives offered by the **new** Heroult for increased production efficiency. There are four others ready to operate on your behalf:

1. **Flat-bottom shells, for simplified relining jobs and good bath temperature distribution.**
2. **Water-cooled skew back roof ring, eliminates need for special roof refractories.**
3. **Cage-type shell construction, minimizes shell distortion and facilitates replacement of damaged shell plates.**
4. **100% mechanical operation, for reliability and ease of maintenance.**

There is a wide range of **new** Heroult Furnaces with shell sizes from 7′0″ up, and with capacities from 6000 to 400,000 pounds. You can obtain them with non-magnetic induction stirring equipment, top charge, door charge, and special duplexing. Non-ferrous furnaces are also available.

The pioneers and leaders in this field for 51 years, Heroult specialists in electric furnaces can help you select and install the equipment best suited to your current and future needs. Get in touch with our nearest contracting office—today—for complete information.



USS

AMERICAN BRIDGE DIVISION
UNITED STATES STEEL CORPORATION, GENERAL OFFICES:
525 WILLIAM PENN PLACE, PITTSBURGH, PA.
Contracting Offices in New York, Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

Heroult
ELECTRIC MELTING FURNACES

UNITED STATES STEEL

Lectromelt

by agreement with

Demag-Elektrometallurgie, G. m. b. H.

Duisburg, Germany

is pleased to announce that they now have
the exclusive license in the
United States and Canada for the
manufacture of

DEMAG ELECTRIC SMELTING FURNACES

for all smelting,
refining and reduction operations

●

You are invited to send requests for
engineering service or product information to

LECTROMELT FURNACE DIVISION
McGraw-Edison Company
314 32nd Street • Pittsburgh 30, Pennsylvania

"More Use per Dollar" With
MANHATTAN *Reinforced* CUT-OFF WHEELS

Actual field reports indicate up to 25% increase in cutting efficiency and cleaning-room production with Manhattan Reinforced Cut-Off Wheels . . . on stationary *and* swing-frame machines! *Built-in* reinforcement makes the difference . . . These wheels are reinforced *two ways* to take the abuse and strain of heavy cutting in foundry operations. First, the use of special fibers increases the strength of the wheel to withstand destruction from centrifugal force by 50%! Second, lateral wheel reinforcement by special super-strength industrial fabric gives resistance to side strain far beyond the ability of conventional cut-off wheels! They offer protection against breakage and provide a safe wheel for foundry use.

Engineered advantages of Manhattan Reinforced Cut-Off Wheels add up to safer, faster cutting and increased production . . . "More Use per Dollar" . . . in foundry operations. The same with Manhattan Snagging and Portable Wheels and Moldiscs; they also save you time and money on other specific metal-removing jobs! Ask a Manhattan sales engineer about Manhattan Reinforced Foundry Cut-Off Wheels and other types of high speed, heavy duty abrasive wheels for your needs.

RM-741

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

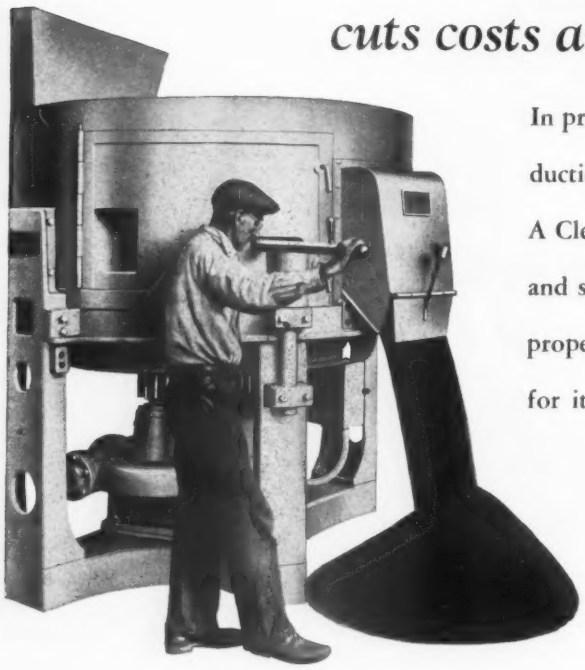
RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

Circle 570 on Inquiry Card—Page 51

the *Clearfield* mixer

cuts costs and speeds production



In preparing foundry sand, if you can speed production and maintain high quality *you cut costs.* A Clearfield Mixer, with its speed, dependability and special mixing features, prepares your sand properly and exactly as you want it, thus paying for itself many times over.

Write today for Catalog No. 83. Clearfield Mixers are available in many sizes to meet every need.

CLEARFIELD
MIXER

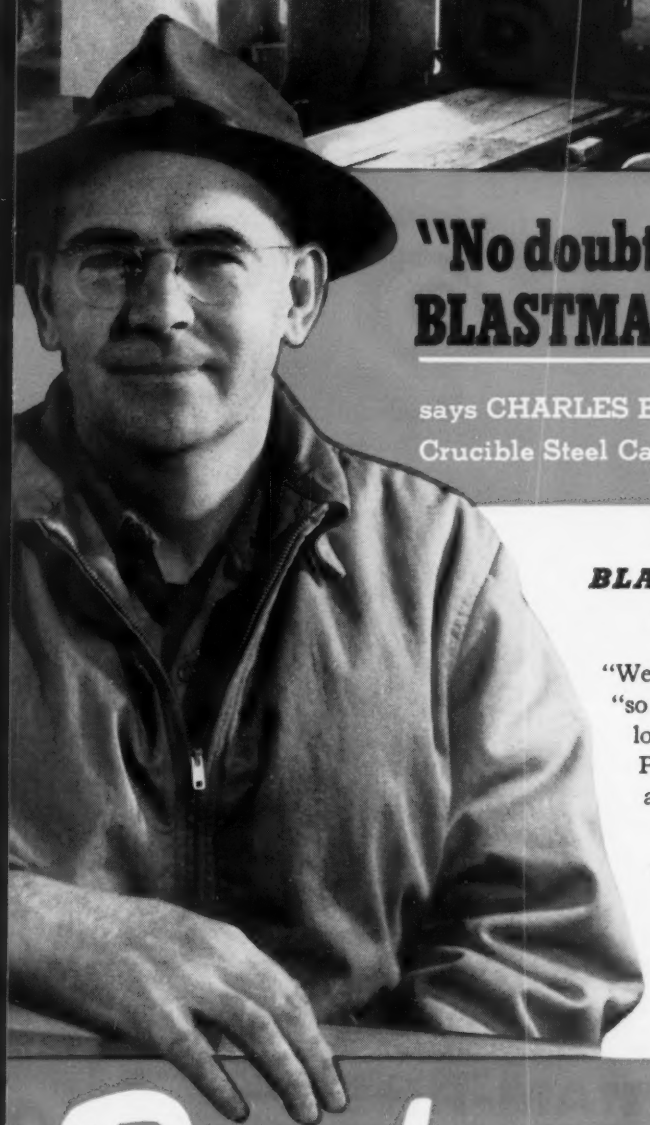
fast,
thorough
sand preparation

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

Circle 571 on Inquiry Card—Page 51

"No doubt about it! That PANGBORN BLASTMASTER was a smart buy!"

says CHARLES BACHMAN, Plant Engineer,
Crucible Steel Casting Co., Lansdowne, Pa.



BLASTMASTER® has eliminated need for a second shift in this cleaning department.

"We're interested in production figures," says Mr. Bachman, "so our blast cleaning equipment has to do good work at low cost. After studying the situation, we picked a Pangborn Blastmaster. It does the kind of job we like and its features are everything they're expected to be!"

If *you* need blast cleaning equipment, look at all makes. Then check the Pangborn Blastmaster. It offers many exclusive features plus a choice of sizes to fit your needs—1½, 3, 6, 12, 18 and 27 cu. ft. Write for Bulletin 703 to PANGBORN CORPORATION, 1400 Pangborn Boulevard, Hagerstown, Maryland.

Pangborn blast cleans cheaper

Circle 572 on Inquiry Card—Page 51

COLEMAN OVENS

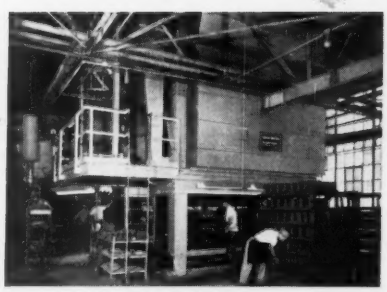
turn minutes into money...

Fast, efficient production of uniformly good cores and molds is vitally important to foundry profits.

When you use old, out-dated core and mold ovens the minutes and hours lost in costly rejects and make-overs . . . the time and effort lost in wasted man power, the production lost in casting scrap eat your profits away. Modern design and exclusive advantages of Coleman Ovens result in immediate production economies, reducing overall core department costs by as much as 50%! Such savings mean increased profits and rapid investment amortization.

More than half a century of specialized foundry oven experience is your assurance that the Coleman Oven recommended to you will do your work to your complete satisfaction. ***As builders of the world's only complete line of foundry ovens we have no reason to recommend any but the best for your purpose.*** Let our experienced engineers give you practical suggestions for your particular requirements.

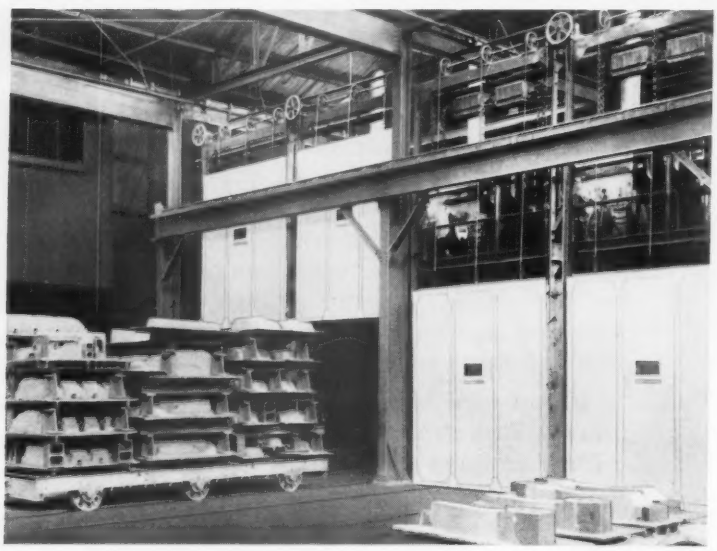
WRITE FOR BULLETIN 54



Coleman Tower® Oven

Coleman Transrack Ovens

Coleman Dielectric Oven



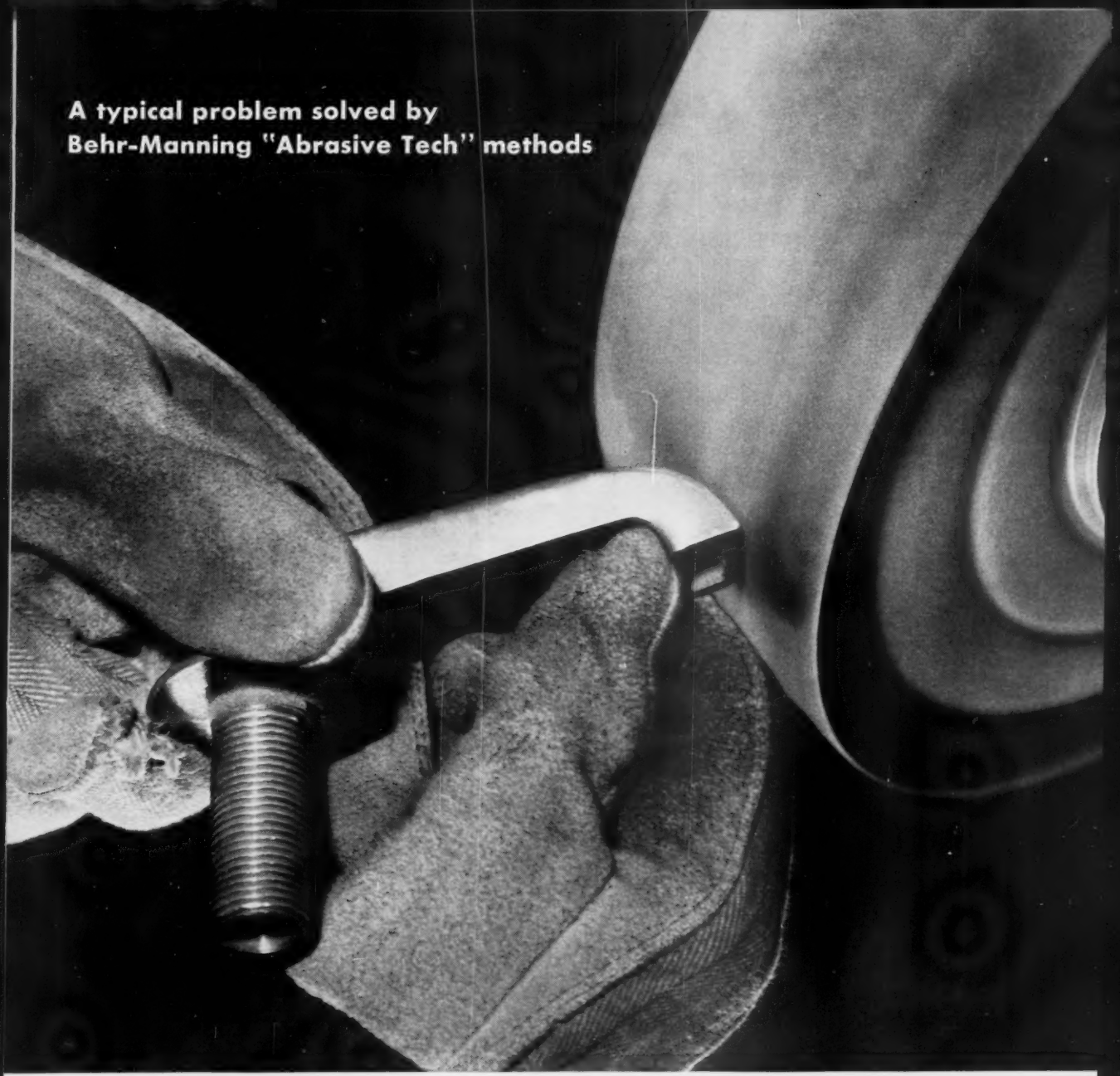
Coleman Car-Type Core Ovens

A COMPLETE RANGE OF TYPES AND SIZES . . .
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD CLEVELAND 13, OHIO

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS



8 steps in finishing were eliminated by using abrasive belts to rough and polish cast-brass faucets prior to plating. Polishing, for example, was faster and smoother with a 3-in. x 90-in. Lightning Metalite Cloth belt, grit 240, running at 9000 sfpm over a 14-in. stitched buff contact roll on a Crown Rheostat Polishing Lathe. The belt is lubricated with a light grease stick. Time, labor, and material costs have all been cut by this "Abrasive Tech" method. Perhaps Behr-Manning technical service may provide similar benefits for your production.

Very often a Behr-Manning methods engineer can provide a helping hand with different finishing problems. Just call the nearest Behr-Manning office for a date. There are 17 well-equipped "Abrasive Tech" Methods Rooms, available for problem-solving, or helping finishers brush up on new techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N. Y. For Export: Norton Behr-Manning Overseas, Inc., New Rochelle, N. Y., U.S.A.

BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY

NORTON ABRASIVES

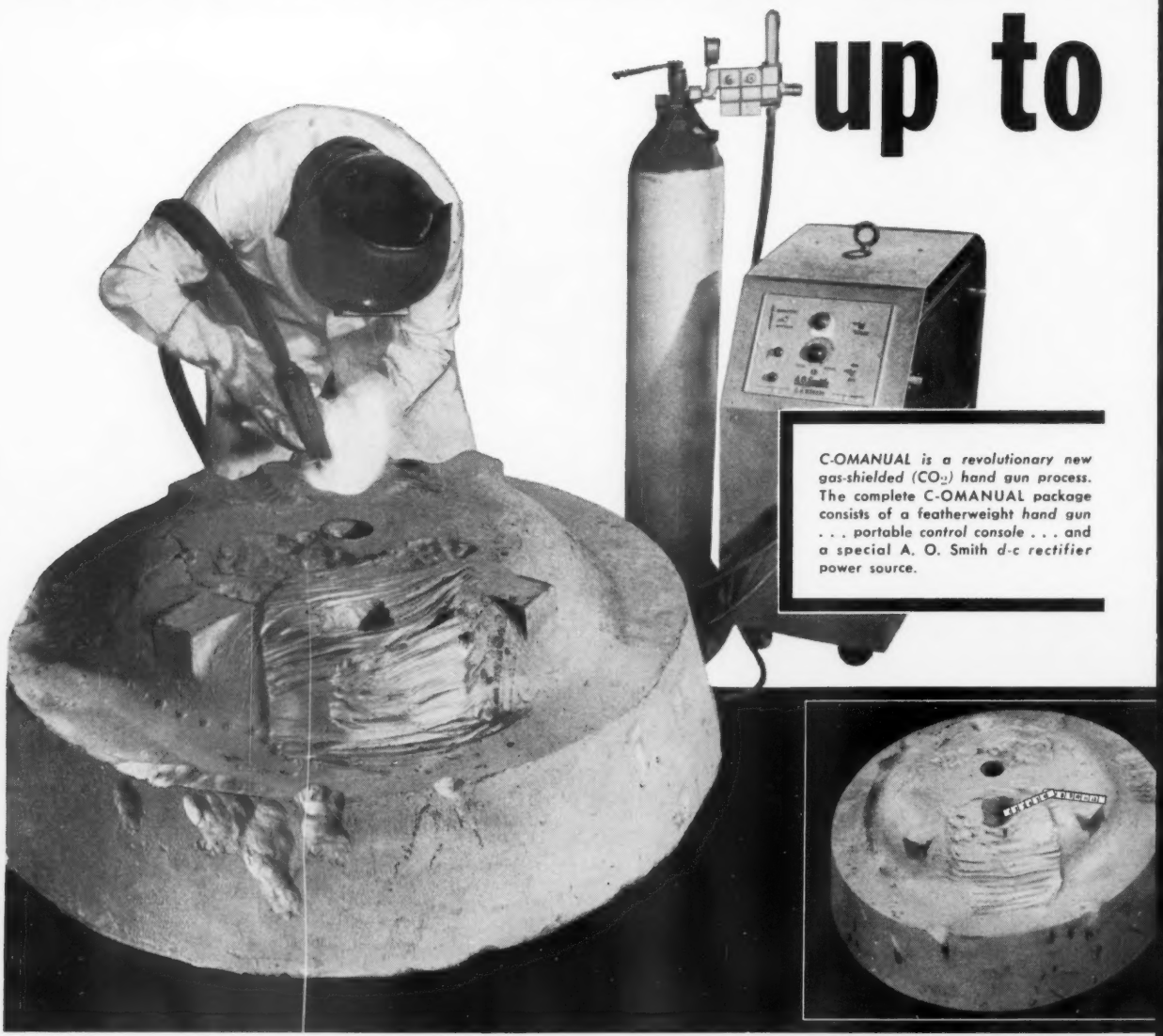
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING ®

Circle 574 on Inquiry Card—Page 51

Midwestern foundry salvages castings...

up to



C-OMANUAL is a revolutionary new gas-shielded (CO_2) hand gun process. The complete C-OMANUAL package consists of a featherweight *hand gun . . . portable control console . . .* and a special A. O. Smith *d-c rectifier* power source.

C-OMANUAL setup — operator with hand gun, portable remote control console and A. O. Smith 600 amp d-c rectifier not visible in illustration.

Here's a casting, imperfect to be sure, but economically salvageable thanks to low-cost, high-speed C-OMANUAL.

Typical comparison of C-OMANUAL and Hand Arc operations in a foundry

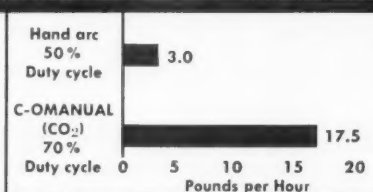
PROBLEM: Repair and build up large steel casting.

	C-OMANUAL (CO_2)	E-6013 HAND ARC
Wire Diameter	1/16"	1/4"
Amperes	450	315
*Duty Cycle %	70	50
†Efficiency %	98	65

***DUTY CYCLE** — Lower on hand arc due to necessary stops for slag removal, electrode changes, etc.

†**EFFICIENCY** — Lower on hand arc due to coating loss, stub loss, spatter, etc.

DEPOSITION RATES



477% INCREASE in metal deposited with carbon dioxide

puts down metal at rates

½ lb. per minute!

with A. O. Smith C-OMANUAL

When it comes to building up blowholes and other imperfections in castings, foundries are "sold" on C-OMANUAL. They're putting down metal at rates up to 30 lbs. an hour where with previous methods they put down three to five lbs. per hour.

Fast, easy, accurate — With C-OMANUAL, the operator works with a light-weight, perfectly balanced hand gun. He has the advantages of visible arc welding — spotting the nozzle's a cinch. And there's no flux to clean, no chipping, no scraping necessary. You can start at the bottom and work right to the top—without stopping. The C-OMANUAL control console automatically adjusts arc length too . . . compensates for distance variations.

Uses lowest cost gas — With C-OMANUAL, the carbon dioxide for shielding the arc costs only one cent per cubic foot and uses approximately 30 cubic feet per hour.

Seeing is believing — For complete details on how C-OMANUAL is helping foundries get an entirely new concept of low cost and high speed in casting salvage — contact your "man from A. O. Smith." He'll be happy to arrange for a demonstration, let you judge for yourself why C-OMANUAL is one of the "hottest" new advances in welding history!

Closeup of typical crater to be filled — diameter approximately 7 inches . . . depth 4 inches.

Rebuilt casting before grinding. Note absence of slag. Deep penetration and weld quality are assured.

Completed casting. On jobs such as this, C-OMANUAL puts down weld metal at least 5 times faster than conventional electrodes.

COST TO DEPOSIT 100 LBS. OF WELD METAL

	SEMI-AUTOMATIC C-OMANUAL (CO_2)	E-6013 HAND ARC
ELECTRODE WIRE	$29.07 (.285)	$20.80 (.135)
POWER	1.54	4.95
GAS	1.71	
WELD LABOR (3.00 per hr.)	17.10	99.00
BURDEN (5.00 per hr.)	28.50	165.00
TOTAL	$77.92	$289.75

A saving of $211.83 for each 100 lbs. of weld metal deposited

Through research A.O. Smith *. . . a better way*

A.O.Smith

CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

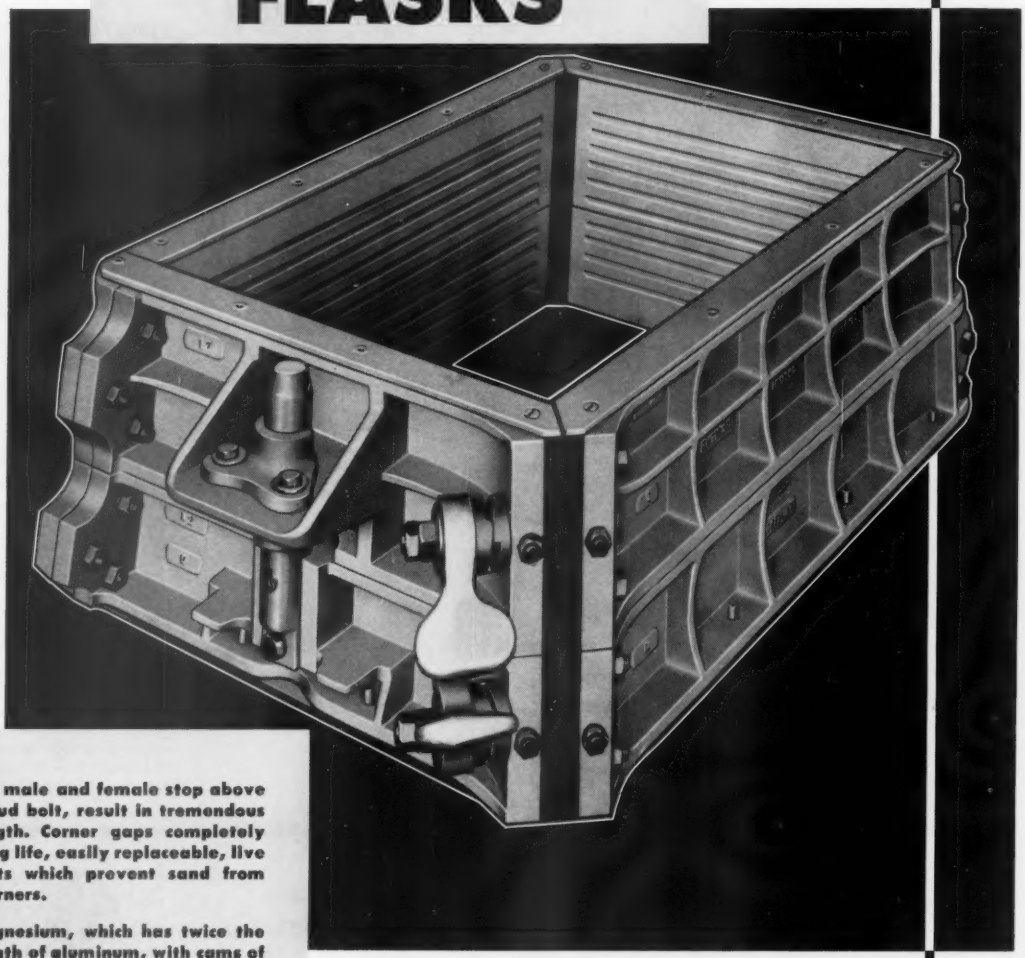
International Division: Milwaukee 1, Wisconsin

Circle 575 on Inquiry Card—Page 51

No Other Flask Gives You All These Advantages

sturdy

Fremont SPREADLOCK FLASKS



■ Two-piece male and female stop above and below stud bolt, result in tremendous corner strength. Corner gaps completely closed by long life, easily replaceable, live rubber inserts which prevent sand from lodging in corners.

Made of magnesium, which has twice the tensile strength of aluminum, with cams of hardened steel forgings, the Spreadlock assures long service.

Magnesium weighs ⅓ less than aluminum, so they are light in weight, easier to handle.

Accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure exacting work.

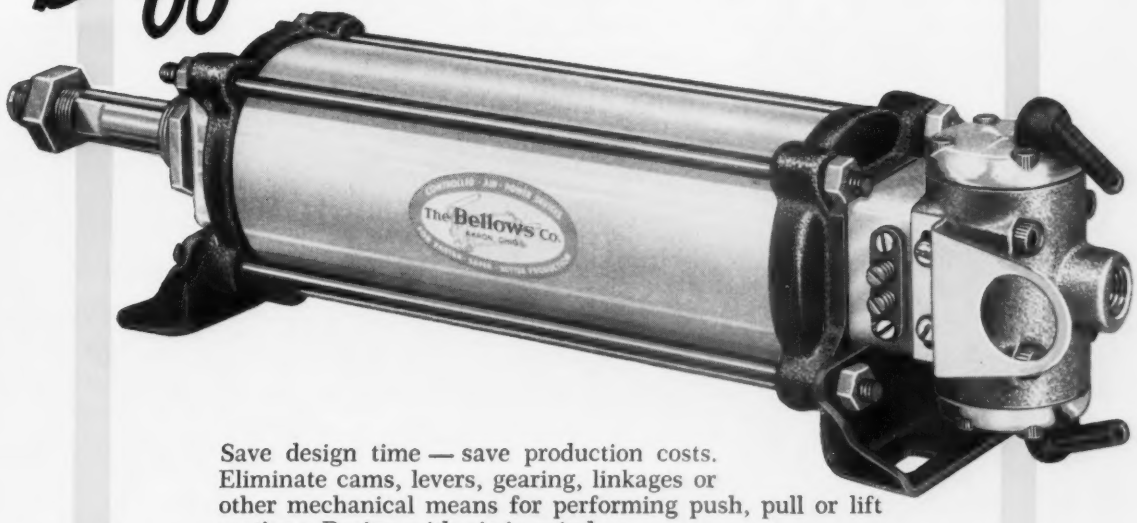
Write today for free literature and prices.

The Fremont FLASK Co.

FREMONT, OHIO

Circle 576 on Inquiry Card—Page 51

SIMPLIFY MACHINE DESIGN WITH THIS *Different* AIR CYLINDER



Save design time — save production costs. Eliminate cams, levers, gearing, linkages or other mechanical means for performing push, pull or lift motions. Design with air in mind.

The Bellows Air Motor is a complete electrically-controlled air cylinder power unit with directional valve and speed controls built in. It requires only one air connection which can be made with flexible hose. Compact, space saving, it fits well into crowded quarters or on moving machine elements. It is fast, responds to a starting impulse instantly. It is easily interlocked and synchronized with related machine movements. Its quality and reliability has been proven in more than quarter of a million installations.

The range of work it can do is limited only by the imagination of the design engineer.

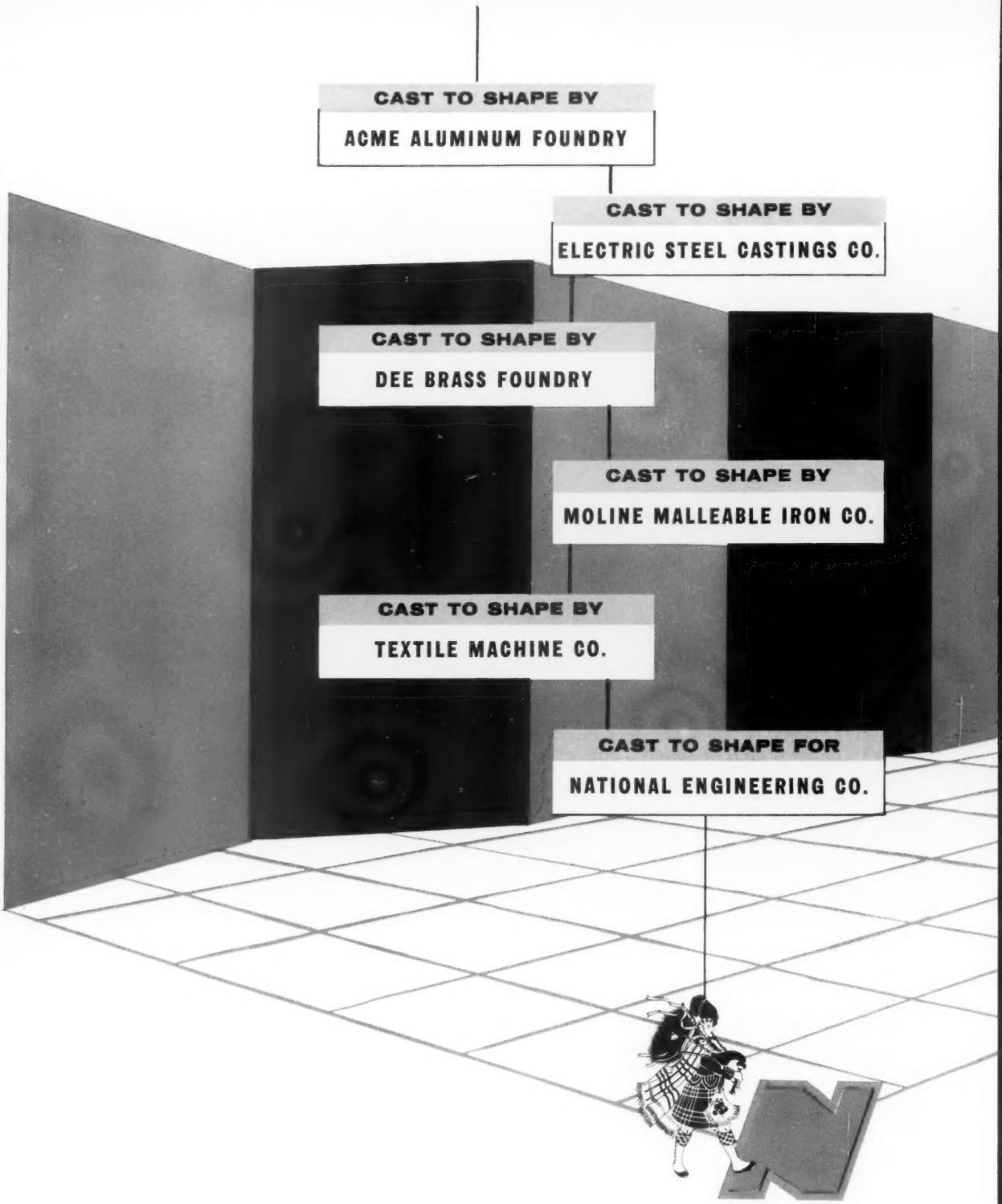
Send for this free booklet

Here in these quick reading pages is the full story of The Bellows Air Motor — what it is doing for others, what it can do for you. Address Dept. FO-457 The Bellows Co., Akron 9, Ohio. Ask for Bulletin BM-25. In Canada, write Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

765-B

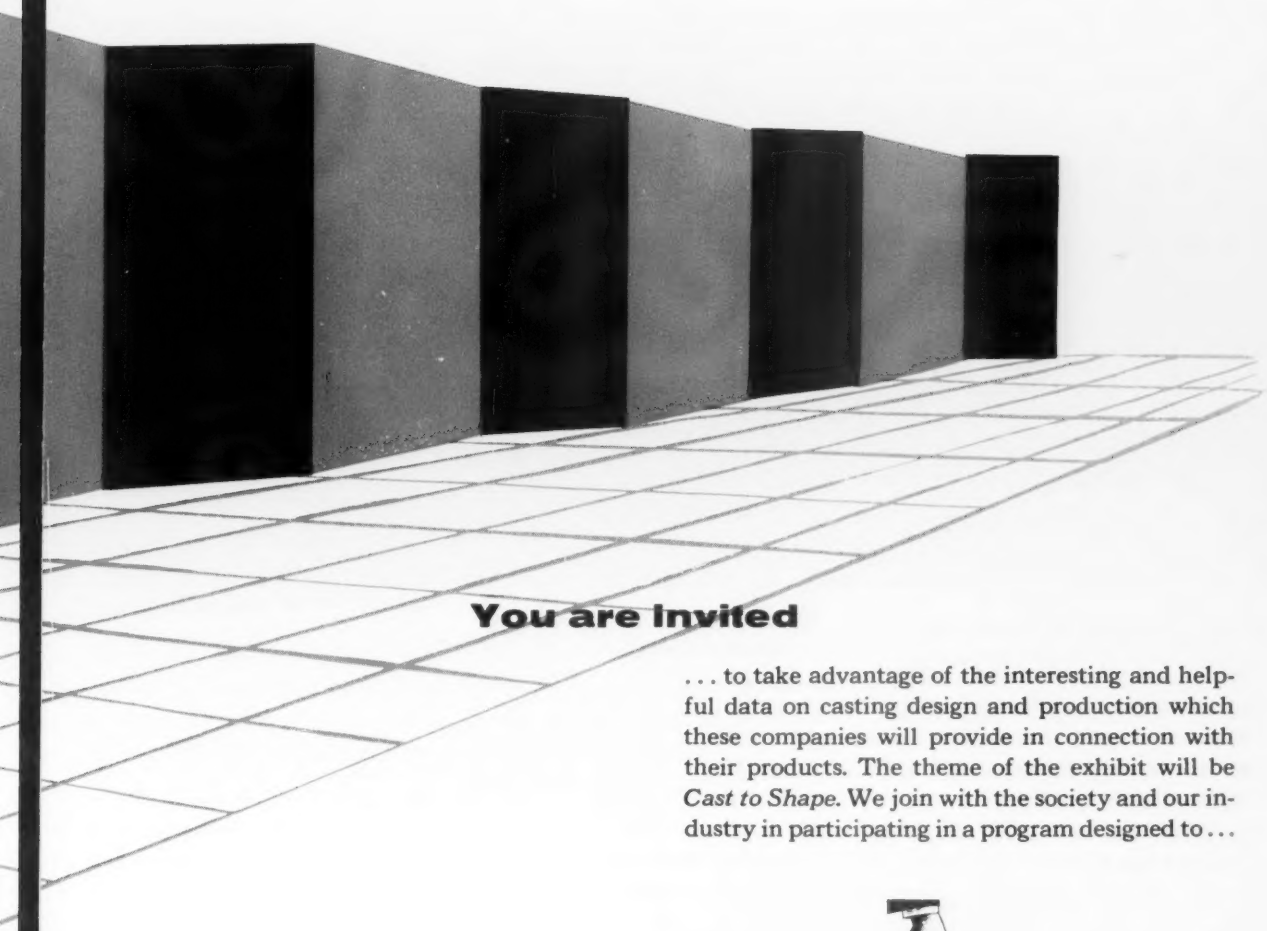
The Bellows Co.
AKRON 9, OHIO

Circle 577 on Inquiry Card—Page 51


CAST TO SHAPE BY
ACME ALUMINUM FOUNDRY
CAST TO SHAPE BY
ELECTRIC STEEL CASTINGS CO.
CAST TO SHAPE BY
DEE BRASS FOUNDRY
CAST TO SHAPE BY
MOLINE MALLEABLE IRON CO.
CAST TO SHAPE BY
TEXTILE MACHINE CO.
CAST TO SHAPE FOR
NATIONAL ENGINEERING CO.

These good customers and friends

. . . will join with us in an informative exhibit which will be on display at the 61st Casting Congress and First Engineered Castings Show to be held by the American Foundrymen's Society in Cincinnati, Ohio on May 6 to 10.



You are invited

. . . to take advantage of the interesting and helpful data on casting design and production which these companies will provide in connection with their products. The theme of the exhibit will be *Cast to Shape.* We join with the society and our industry in participating in a program designed to . . .

NATIONAL ENGINEERING COMPANY
646 Machinery Hall Bldg. • Chicago 6, Illinois

Circle 578 on Inquiry Card—Page 51

Picture of Five Wheelbarrows

What makes an HA PAYLOADER® best for your job?

Shortest turning radius
Higher dumping height
Biggest Bucket (18 cu. ft. payload)
Hydraulic load-shock-absorber
40° bucket tip-back at ground level
Exclusive one-lever bucket control

THE FRANK G. HOUGH CO.
703 Sunnyside Ave., Libertyville, Ill.

Send data on "PAYLOADER" tractor-shovels
☐ Models HA (18 cu. ft.) and HAH (1 cu. yd.)
☐ Larger models to 2¼ cu. yd.

Name _____

Title _____

Company _____

Street _____

City _____

State _____

56F

Of course you don't see 5 wheelbarrows, but you do see one man on a model HA "PAYLOADER" at the foundry of Domestic Pump & Mfg. Co., Shippensburg, Pa., and the management says it does as much work as 5 men with wheelbarrows handling sand, castings and scrap. Foundries and metal-working plants everywhere like this "PAYLOADER" because it can travel and work where others can't — negotiate narrow aisles, boxcar doors and corners. Yet it boasts a bigger bucket (18 cu. ft. payload) and can dig more, carry more and deliver more tonnage than any tractor-shovel anywhere near its size.

It will pay you to find out what this new style model HA or a larger "PAYLOADER" can do for you. Your nearby Distributor is willing to demonstrate and also tell you about the extra useful attachments — sweeper, fork lift, tine bucket, snow plow, etc. See him today.

SAY "HUFF"

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Circle 579 on Inquiry Card—Page 51

Late News

PRICE CHANGES: Ferrous scrap prices continue to slip, but this advantage to some foundries is offset by the recent increase of $2 a ton in pig iron prices at most centers. In addition, the pig iron silicon differential was increased from 50 cents to 75 cents a ton, and the manganese differential of 50 cents a ton now applies on each 0.25 per cent over base, instead of on each 0.50 per cent.

Price reductions of 0.9-cent a pound for 50 per cent ferrosilicon and 1 cent a pound for silicomanganese were made by Electro Metallurgical Co., effective March 19.

BUYS OHIO FOUNDRY: Chromalloy Corp., White Plains, N. Y., has bought Elyria Foundry Division, Elyria, O., from Industrial Brownhoist Corp., Bay City, Mich., for about $2 million. Elyria Foundry will operate as a division of Chromalloy and will be headed, as it has been during the last 10 years, by Howard C. Gollmar. Mr. Gollmar has been elected a director of Chromalloy and executive vice president of the Elyria Foundry Division. No changes will be made in personnel. Elyria is a producer of large gray iron castings for the machine tool industry. The firm is 56 years old.

NICKEL FROM CUBA: Cuban American Nickel Co., subsidiary of Freeport Sulphur Co., New York, has contracted for the government to buy nickel and cobalt produced from new facilities to be built by Cuban American in Cuba and the U.S. Ores will be mined from deposits owned by Freeport subsidiaries at Moa Bay, Cuba. The government will have the right to require delivery to it of 30 per cent of the annual output of nickel. Freeport hopes to begin production in the summer of 1959. The project will cost $100 million and is planned to produce 50 million lb of nickel and 4.4 million lb of cobalt per year.

GIFS SEMINARS: Gray Iron Founders' Society, Cleveland, has scheduled a series of regional marketing and sales seminars this spring in the United States and Canada. Purpose of the meetings is to disseminate data accumulated in recent surveys of castings buyers and product designers, to examine recent market trends and to discuss foundry sales techniques and policy in detail.

Several of these area meetings already have been held. Those scheduled for the future include: Eastern Regional, Apr. 8-9, Nassau Tavern Hotel, Princeton, N. J.; Ontario-Eastern Canada Regional, May 16, Royal York Hotel, Toronto; Midwestern Regional, May 28, Drake Hotel, Chicago; California Regional, June 14, Disneyland Hotel, Anaheim, Calif.; and Michigan-Indiana Regional, May 3, Schuler's Inn, Marshall, Mich.

STEEL FOUNDERS ELECT: H. F. Park Jr., General Steel Castings Corp., Granite City, Ill., was re-elected president of the Steel Founders' Society of America at its recent annual meeting. B. P. Hammond, Blaw-Knox Co., Pittsburgh, is the new vice president, and R. G. Parks, National Malleable & Steel Castings Co., Cleveland, was re-elected treasurer.

At the meeting, Henry D. Phillips, Adirondack Foundries & Steel Inc., Watervliet, N. Y., was presented the society's Technical & Operating Gold Medal. Allen M. Slichter, Pelton Steel Casting Co., Milwaukee, was awarded the Lorenz Memorial Gold Medal.

ACQUIRES FOUNDRY: New England Metallurgical Corp., Boston, has taken over the former American Brake Shoe Co. plant in Norwood, Mass., and will operate it as a division. New England Metallurgical specializes in metals processing, including heat treating and metal joining, and manufactures heat treating furnaces and other metalworking equipment.

PERSONALS: Jackson Krall, recently sales representative for Milwaukee Malleable & Grey Iron Works, Milwaukee, has been appointed sales manager . . . Aubrey Bukowski has left Wehr Steel Co., Milwaukee, to join the Castings Section, Metallurgy Division, Naval Research Laboratory, Washington . . . Ed-

ward A. Kooper, foundry engineer, American Radiator & Standard Sanitary Corp., Bayonne, N. J., has been named development engineer, Gray Iron Research Institute Inc., Columbus, O. . . . John A. Dugan, recently production control manager, West Steel Casting Co., Cleveland, has been made manager of the company's shell molding division and customer service. Bruce Aiken, formerly with Crucible Steel Casting Co., Cleveland, becomes production control manager . . . John G. Frischkorn, district sales manager, Cleveland Tramrail Division, Cleveland Crane & Engineering Co., Wickliffe, O., has been appointed assistant sales manager of the division . . . Pickands Mather & Co. has appointed John A. Krum district sales manager at Cincinnati and Ben J. Roth to a similar post at Washington . . . Peter J. May has been named manager, foundry sales, Cleveland Quarries Co., Amherst, O.

FURNACE SALES: Industrial furnace sales in January and February were off 30 per cent from last year, while induction and dielectric heating equipment orders rose 30 per cent, the Industrial Heating Equipment Association reports.

SAND PLANT: Whitehead Brothers Co., New York, plans installation of a new sand processing plant on an 1800-acre site near Blaney, S. C.

MISCELLANY: Research-Cottrell Inc., Bound Brook, N. J., dust cleaning equipment manufacturer, has added to its line the dust collector formerly manufactured by the Aerodyne Development Co., Cleveland . . . American Smelting & Refining Co. is expanding its central nonferrous metal research laboratories at South Plainfield, N. J., by one-third . . . Ellicott Machine Corp., Baltimore, has acquired a controlling interest in McConway & Torley Corp., Pittsburgh . . . February orders for freight cars totaled 6065, against 5328 in January and 1675 a year ago. Backlogs of builders on March 1 included 111,965 cars . . . W-K-M Division of ACF Industries Inc. is reported to be considering plans to build a gray iron foundry at Missouri City, near Houston, Tex. The division, a valve and fittings manufacturer, has been supplied castings by the Detroit foundry of ACF . . . Production of primary aluminum totaled 266,094 tons in January and February, compared with 273,156 tons a year ago.

Prices of Foundry Metals and Coke

(As of March 26, 1957)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.50-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$67.00	$67.50
Birmingham	59.00	63.00
Buffalo	65.00	65.50
Chicago	65.00	65.00
Cleveland	65.00	65.00
Duluth	65.00	65.00
Erie, Pa.	65.00	65.00
Everett, Mass.	65.00	65.50
Fontana, Calif.	71.00	....
Geneva, Utah	65.00	....
Granite City, Ill.	66.90	67.40
Neville Island (Pittsburgh)	65.00	65.00
Swedeland, Pa.	67.00	67.50
Toledo, O.	65.00	65.00
Troy, N. Y.	67.00	67.50
Youngstown, O.	....	65.00

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 31.50; tin bronze, No. 225, 40.50; No. 245, 35.50; high-leaded tin bronze, No. 305, 35.50; No. 1 yellow, No. 405, 25.25; manganese bronze, No. 421, 28.50.

ALUMINUM: 99 per cent plus primary ingots 27.10. Secondary No. 12 alloy 22.50-23.50. Deoxidizing grades: No. 1, 23.75; No. 4, 20.25.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 32.00, delivered Connecticut valley.

ZINC: High grade 14.85 delivered. Die casting alloy No. 3, 17.50; No. 2, 18.50, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$42.00-43.00	**$50.00-51.00	.....	.....	.....	.....	**$58.00-59.00
Boston*	**44.00-44.50	**38.00-39.00	.....	.....	**44.00-45.00	.....	.....
Buffalo	48.00-49.00	**43.00-44.00	.....	.....	**47.00-48.00	.....	62.00-63.00
Chicago	47.00-48.00	42.00-43.00	.....	49.00-50.00	49.00-50.00	57.00-58.00	60.00-62.00
Cincinnati*	**44.00-45.00	**46.00-47.00	**46.00-47.00	.....	**55.00-56.00	.....	**67.00-68.00
Cleveland	43.00-44.00	52.00-53.00	41.00-42.00	51.00-52.00	54.00-55.00	57.00-58.00	71.00-72.00
Detroit*	**40.00-41.00	**48.00	**41.00	**52.00	.....	**53.00	.....
Los Angeles	55.00	**60.00	.....	.....	.....	.....	.....
New York*	46.00-47.00	44.00-45.00	46.00-47.00	.....	.....	.....	.....
Philadelphia	52.00-54.00	48.00-49.00	56.00	.....	55.00-56.00	64.00	71.00-72.00
Pittsburgh	48.00-49.00	48.00-49.00	46.00-47.00	.....	57.00-58.00	.....	70.00-72.00
St. Louis*	45.50	45.50	40.00	48.50	.....	.....	63.00
San Francisco	55.00	57.00	42.00	57.00	57.00	.....	.....
Seattle	53.00	52.00-54.00	45.00-50.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOS-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

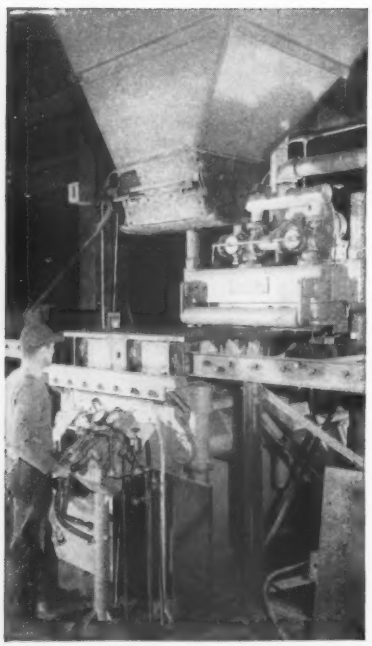
LYQUAFACE
The liquid sand grain coating

Circle 580 on Inquiry Card—Page 51

Minerals International Chemicals

10 IMPROVEMENTS

1957 TACCONE DIAFORM MOLDING MACHINES



1 OUTBOARD STRIPPING PINS—With outboard pins, you have maximum versatility of flask size, with simple modification to bar-lift or roller-rail lift and a clean working surface at all times.

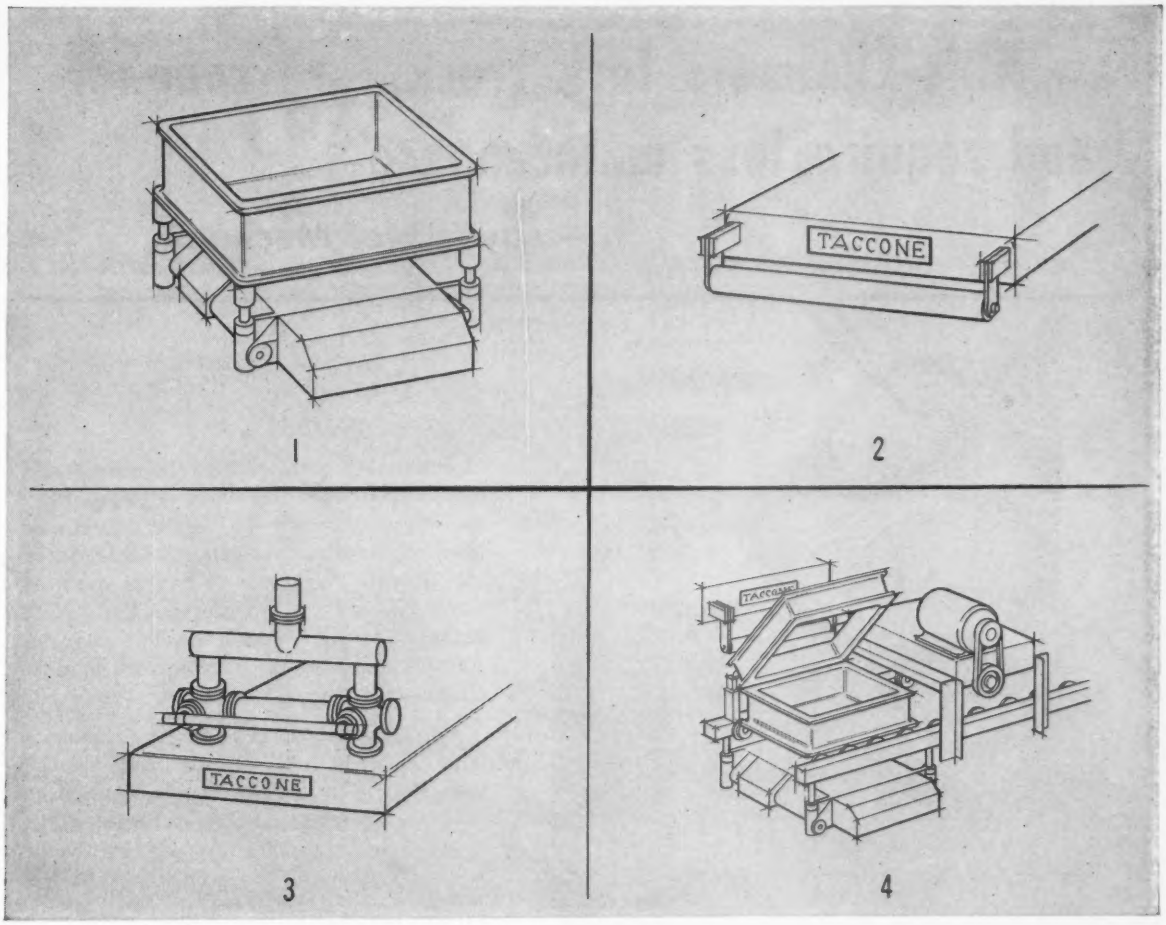
2 PREPACK ROLLER—Spill sand virtually eliminated automatically without danger of ram-offs.

3 DOUBLE INJECTION VALVE AND HIGHER POWER SUCTION—Faster air flow in and out of diaphragm head for maximum speed.

4 UPSET STRIKE-OFF—With this auxiliary equipment you can use shallower, more flexible tight flasks or removable flasks.

5 OUTBOARD OIL CUSHION—Better shock-absorption of traverse car movement cuts molding cycle to the bone.

6 ENCLOSED GEAR BOX IN OIL BATH—Entire strip mechanism working in a sealed bath of oil assures accurate stripping with minimum maintenance.

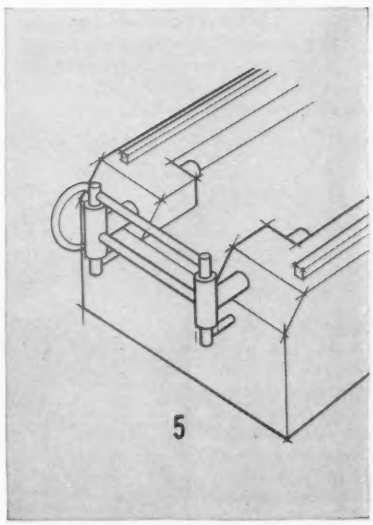


7 DRAWER TYPE MASKING FRAME—You can change flask size quickly for short run and jobbing operations by simple positioning of a metal mask.

8 QUICK-CHANGE TANK—You can now carry a spare diaphragm "loaded and ready" for fast replacement and minimum down time.

9 ELECTRICAL CONTACTS AND AUTOMATION—All models now available with full automation, semi-automation or electrified manual operation permitting a completed molding cycle in as little as seven seconds.

10 FLASK FILLING AND INDEXING EQUIPMENT—For maximum speed, all models are available with built-in automatic flask filling and indexing equipment.



Write for the Taccone Diaform Molding Machine GREEN BOOK

EASTERN CLAY PRODUCTS DEPT. • INTERNATIONAL MINERALS & CHEMICAL CORPORATION • 20 NORTH WACKER DRIVE • CHICAGO 6

Dixie Bond • Black Hills Bentonite • Revivo Bond • Plasti-Bond • Revivo Core Paste • Cupolinor • Cupoline • Taccone Molding Machines

"Allis-Chalmers fork trucks are tougher and require less maintenance"

— says Chief Mechanic

"I think one reason the Allis-Chalmers trucks have outperformed the others is because they are easier to clean and service," continues Milt, the chief mechanic at Neenah Foundry Co., Neenah, Wisconsin. "I like the overhead valves and wet cylinder sleeves. I'm glad to see that they are replacing the old trucks with Allis-Chalmers trucks. This is going to make our job a lot easier."

Allis-Chalmers fork trucks *are* replacing other makes of trucks in the plant, because, according to J. P. Keating, vice-president, "On checking with operating and maintenance departments, we definitely feel your equipment is much better than competitive models. Design features, combined with the proved and dependable Allis-Chalmers engine, make this an outstanding industrial truck. We therefore recommend it without reservation."

Let your Allis-Chalmers material handling dealer give you the complete story on why owners, operators, servicemen — everyone likes Allis-Chalmers fork trucks. Better yet, let him demonstrate one and you'll see for yourself.

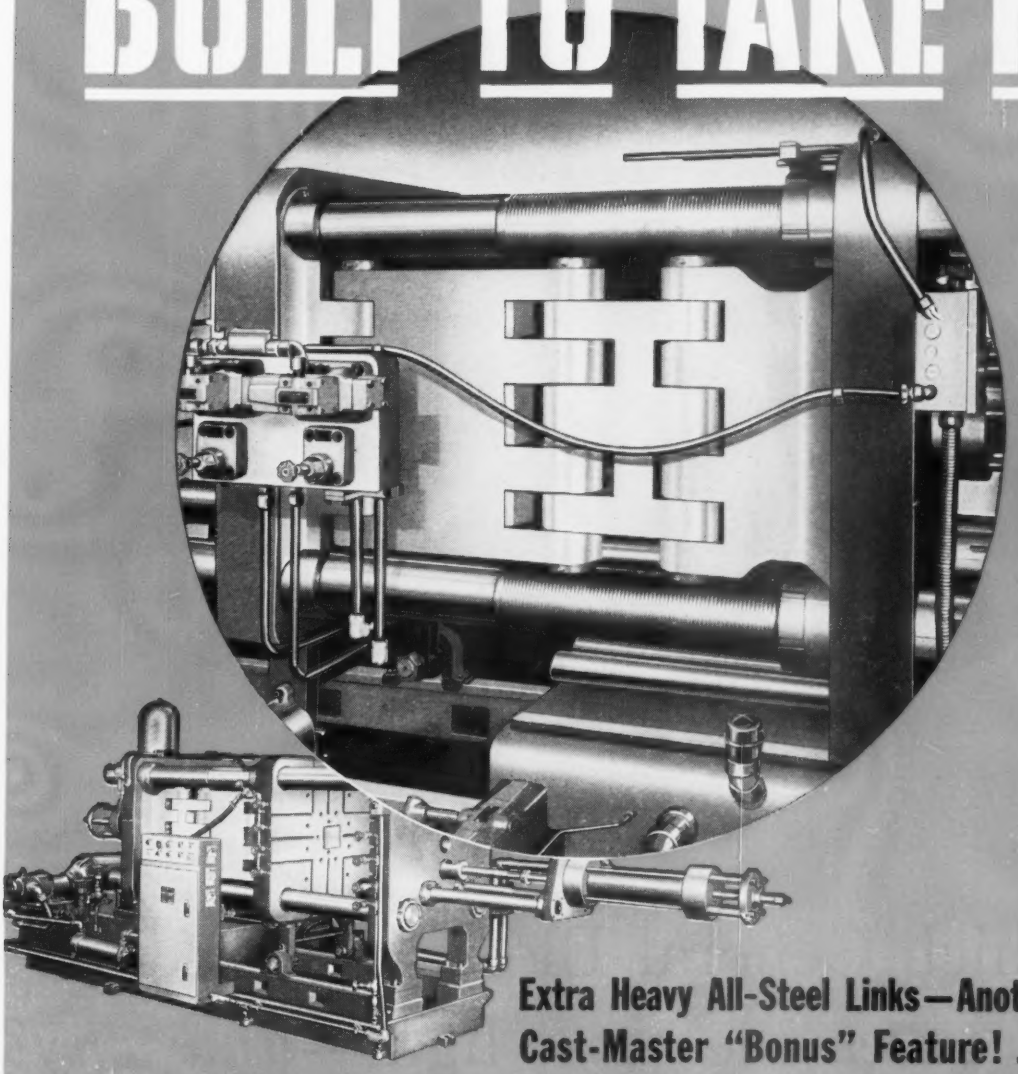
MATERIAL HANDLING DEPARTMENT, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Mr. Gast, operator of one of the Allis-Chalmers fork trucks at the Neenah Foundry says: "This truck must have been engineered for the driver. The parking brake is the best I've ever used. The shifting is handy, it speeds up my operation . . . I like where the hydraulic controls are located."

BH-40

BUILT TO TAKE IT



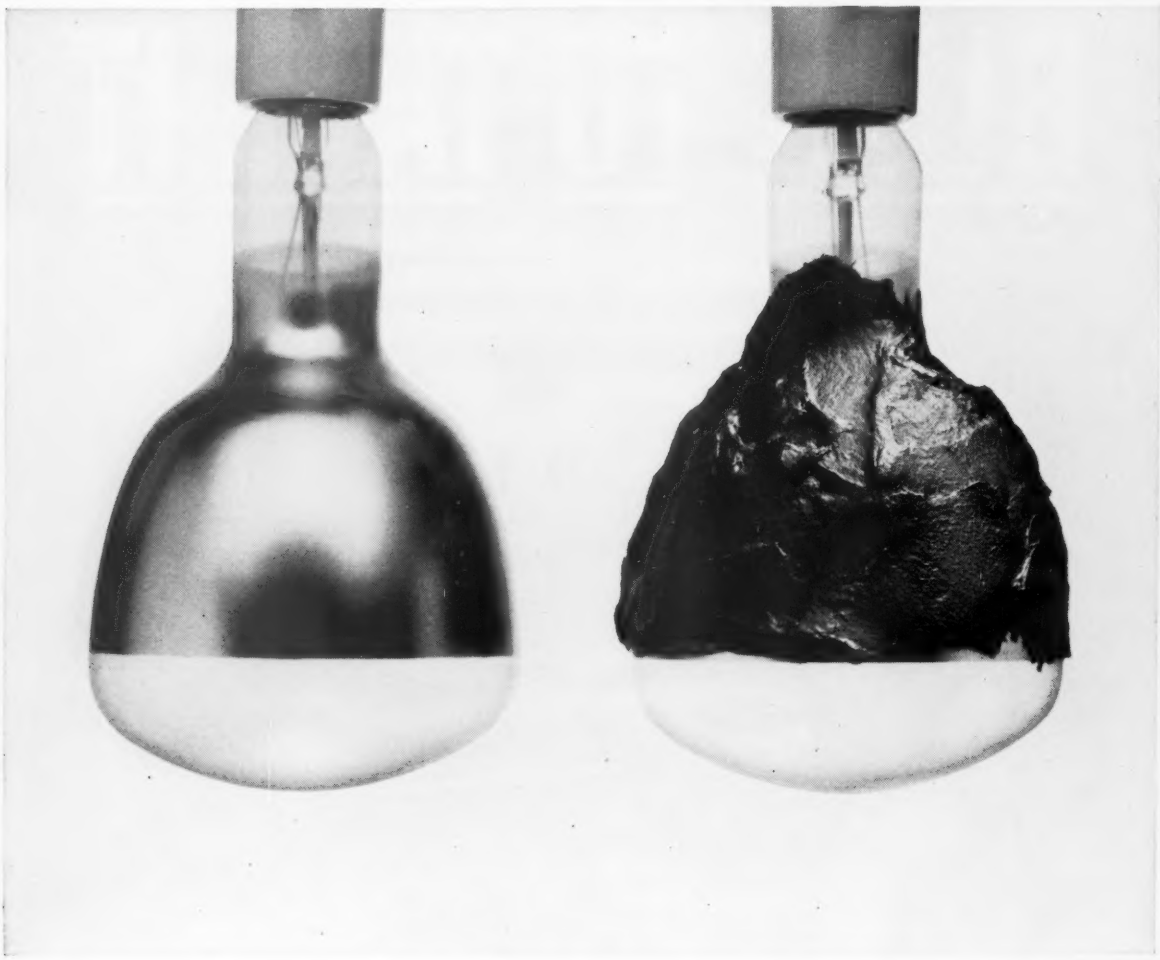
Extra Heavy All-Steel Links—Another Cast-Master "Bonus" Feature! . . .

The story of Cast-Master quality is a story of "bonus" features — like the link system shown here. Cast-Master links are super-rugged — all-steel — machined — with wide spread for positive lock-up, and multiple shear points to eliminate link pin breakage. Result? — more precision — lower maintenance costs for Cast-Master owners. To get the complete "bonus" story, send for the new Cast-Master catalog. It describes exclusive Cast-Master developments, gives detailed specifications on eight new models that are setting the pace for the industry.

EASTERN REPRESENTATIVE: Milton Harmon, 18 Rock Road, Milford, Connecticut

CAST-MASTER Inc. 23901 AURORA ROAD BEDFORD, OHIO

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS



Which General Electric Reflector lamp gives the most light—*and why?*

A THICK coating of tar was smeared on the surface of the right hand lamp where dirt normally collects in use. But in this type of G-E Lamp, it makes no difference. *Both lamps still deliver the same amount of light!*

Why? The important facts are: Dirt just can't get *inside* to the pure silver reflector, sealed in the bulb. Hardly any dirt collects *outside* on the bulb bottom where all the light comes from. That's why light output is practically unaffected by dust and dirt. And since they seldom if ever need cleaning, maintenance costs take a sharp drop.

General Electric *Filament* Reflector Lamps are available in 500-watt, 750-watt and 1000-watt sizes with pure silver reflectors. G-E *Mercury* Reflector Lamps are available in 400-watt (silver or phosphor reflectors), and 1000-watt (phosphor reflector) sizes.

SWITCH TO G-E REFLECTOR LAMPS (Filament or Mercury) YOU'LL GET MORE LIGHT, SAVE ON MAINTENANCE, TOO!

Your General Electric Lamp Representative will be glad to help you pick the best one for your plant. Call him today—or write: General Electric Large Lamp Dept. F-4, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Circle 584 on Inquiry Card—Page 51

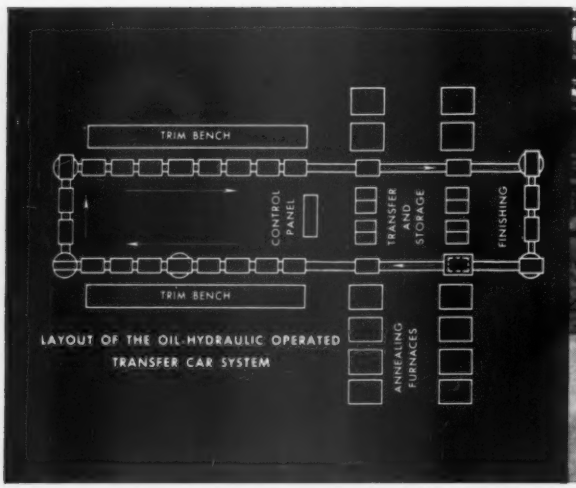
Circle 585 on Inquiry Card→

Sand Blowers

by INTERNATIONAL
MOLDING MACHINE COMPANY
LA GRANGE PARK, ILLINOIS

hydraulically-powered castings transfer system designed and built by **JEFFREY**

makes the job easier, safer and more efficient



LAYOUT OF THE OIL-HYDRAULIC OPERATED TRANSFER CAR SYSTEM

Transfer cars make a 600-foot circuit in moving from trim benches to annealing furnaces to finishing and back at National Malleable & Steel Castings Co., Cleveland, Ohio.

Transfer car on a turntable

27 shuttle cars, each capable of handling a 6-ton load, carry castings around this circuit at most efficient speed and with a minimum of manual labor. The system's successful operation during the past two-and-a-half years is evidence of the wise engineering employed and sturdiness of the construction.

Many limiting conditions led Jeffrey and National Malleable to decide upon hydraulic equipment and drives underground, in a tunnel below the car tracks. The ten pushers on the straight-line movements and the five 10-foot turntables are powered by individual hydraulic units. In operation, cars advance one space every five minutes and turntables rotate to receive and discharge the cars.

Jeffrey makes layouts of equipment and mechanizes complete foundries, or supplies individual pieces of equipment. Catalog 845 describes the services. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Right, Princess Wenatchee! Chief "Stretch" Keokuk was having his own way around the bucket . . . 'til Junior came up with a jump shot of his own. Chalk up two more points for the heady hot shot on the pogo stick!

Boing . . . boing . . . boing—you're already three jumps ahead of melt problems when you choose Keokuk Silvery Pig, the superior form of silicon introduction. Many foundries and steel plants use it and keep a close guard on costs. Pig for pig, car for car—its uniformity never varies! Handle by magnet, charge by weight or count the pigs for equal accuracy. Aluminum producers . . . get the jump on your problems by using Keokuk Silicon Metal!

KEOKUK ELECTRO-METALS COMPANY
Keokuk, Iowa
Wenatchee Division, Wenatchee, Washington

When you think of SILICON, think of KEOKUK!

KEOKUK SILVERY PIG IRON

SILICON METAL—OTHER FERROALLOYS

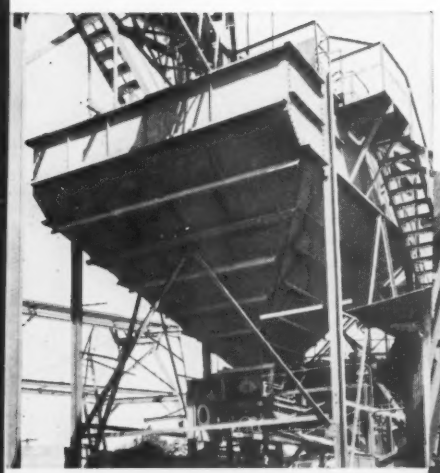
Keokuk Silvery Pig—the superior form of silicon introduction for foundries and steel plants—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

SALES AGENT: MILLER AND COMPANY
332 S. Michigan Ave., Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

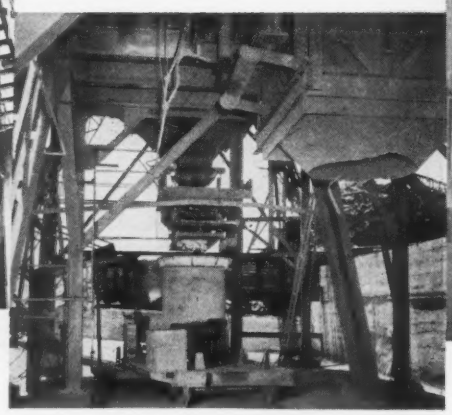
Circle 587 on Inquiry Card—Page 51

More Melt Per Man-Hour

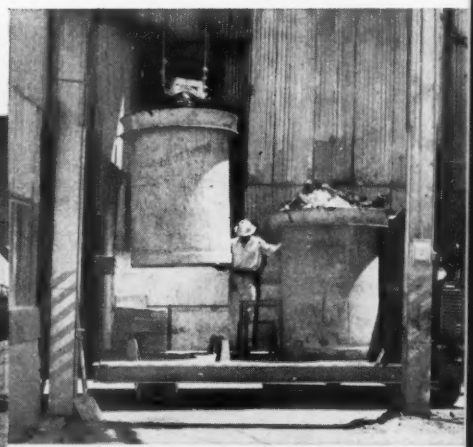
AT CHARLOTTE PIPE AND FOUNDRY



Large Whiting storage bins at Charlotte hold a supply of coke and limestone. Bins are kept full from adjacent stockpiles via an overhead crane.



Charging bucket is brought to Whiting weigh hoppers on a Whiting transfer car. Push-button control regulates quantity of each charge component and scales register exact weights.



Transfer car moves loaded bucket to charging area. Two buckets are used, one is refilled while other is charging. System permits steady, uninterrupted charging.

Circle 588 on Inquiry Card—Page 51

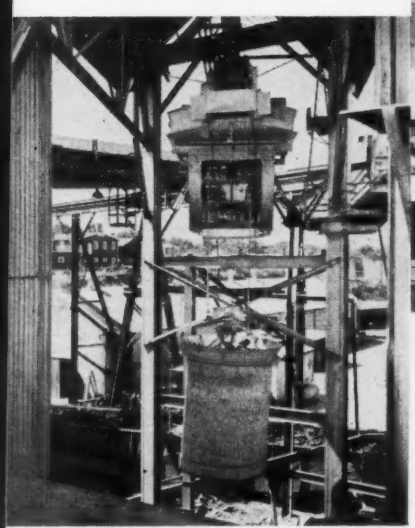
Whiting Equipment Mechanizes Operations...
from Making-up the Charge to Tapping the Cupola

A complete mechanization program is "paying-off" for Charlotte Pipe and Foundry Co., Charlotte, N. C. Whiting equipment plays an important part in reducing man-hours and production time as well as improving casting quality. The entire handling and melting system . . . consisting of a charger, two cupolas, holding and transfer ladles and monorail system between cupolas and molding department . . . works in perfect harmony to produce the desired results.

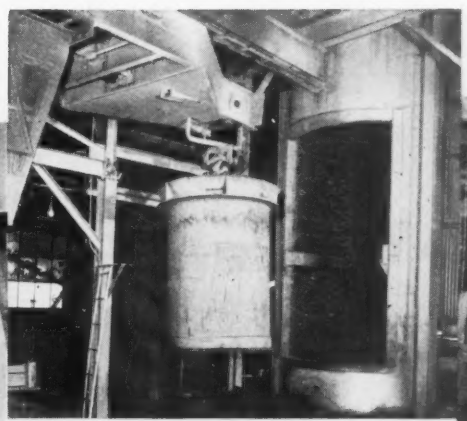
With production at the highest level in Charlotte's history, just three men handle all make-up and charging—one on the make-up crane, one on the transfer car and one operating the charging car. Before mechanization the company employed twice as many men on the charging floor alone as are now required in the entire melting department. Mechanical handling and charging also provides them with better-than-human metallurgical control. The illustrations below from left to right tell the Charlotte story quickly!

Whiting foundry equipment can also help you boost production and cut costs. Write today for Bulletin FY-172R on Whiting Cupolas and Bulletin FY-153R on Whiting Mechanical Chargers.

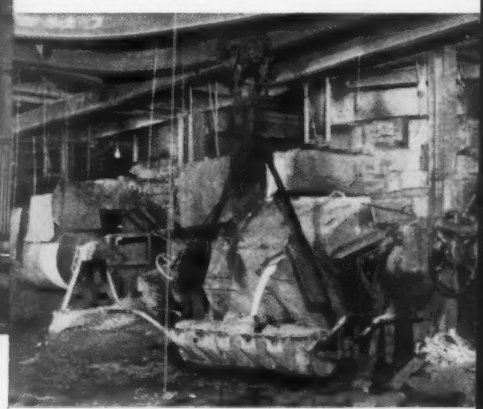
WHITING CORPORATION 15607 Lathrop Ave., Harvey, Ill.



Bucket is hoisted on a Whiting monorail charger. One charger serves both Whiting cupolas, which operate simultaneously about 4½ hours a day. 165-200 tons are melted daily.



Whiting cone-bottom bucket assures proper placement of charge in cupolas. One cupola went in service in 1930 and the other in 1950, the same time the make-up equipment and charger were installed.



Cupolas are tapped into large Whiting holding ladles, which are tilted into transfer ladles. Monorail system carries ladles to Charlotte's molding department.

WHITING

FOUNDRY EQUIPMENT

SUPERSTEEL SHOT

AN ELECTRIC FURNACE PRODUCT

WHAT IS SUPERSTEEL?

SUPERSTEEL shot is electric furnace carbon steel. It is manufactured from highest grade materials and alloyed with other elements to give it maximum hardness and toughness.

IS IT HEAT-TREATED?

SUPERSTEEL shot is precision heat-treated in instrument-controlled furnaces. Laboratory supervision gives the product uniform hardness and maximum shot life.

WHAT ABOUT CLEANING POWER?

SUPERSTEEL shot is produced in a hardness range engineered to clean any product normally cleaned by shot.

OTHER ADVANTAGES

1. RESISTANCE TO BREAKDOWN—10 or more times that of iron shot. Two or more times that of malleable shot.
2. REDUCES MACHINE MAINTENANCE EXPENSE—up to 50% or more.
3. MORE ATTRACTIVE FINISH—Leaves no carbon deposit or metallic residue or imbedment.
4. Reduces storage, handling, freight, dust disposal expense.

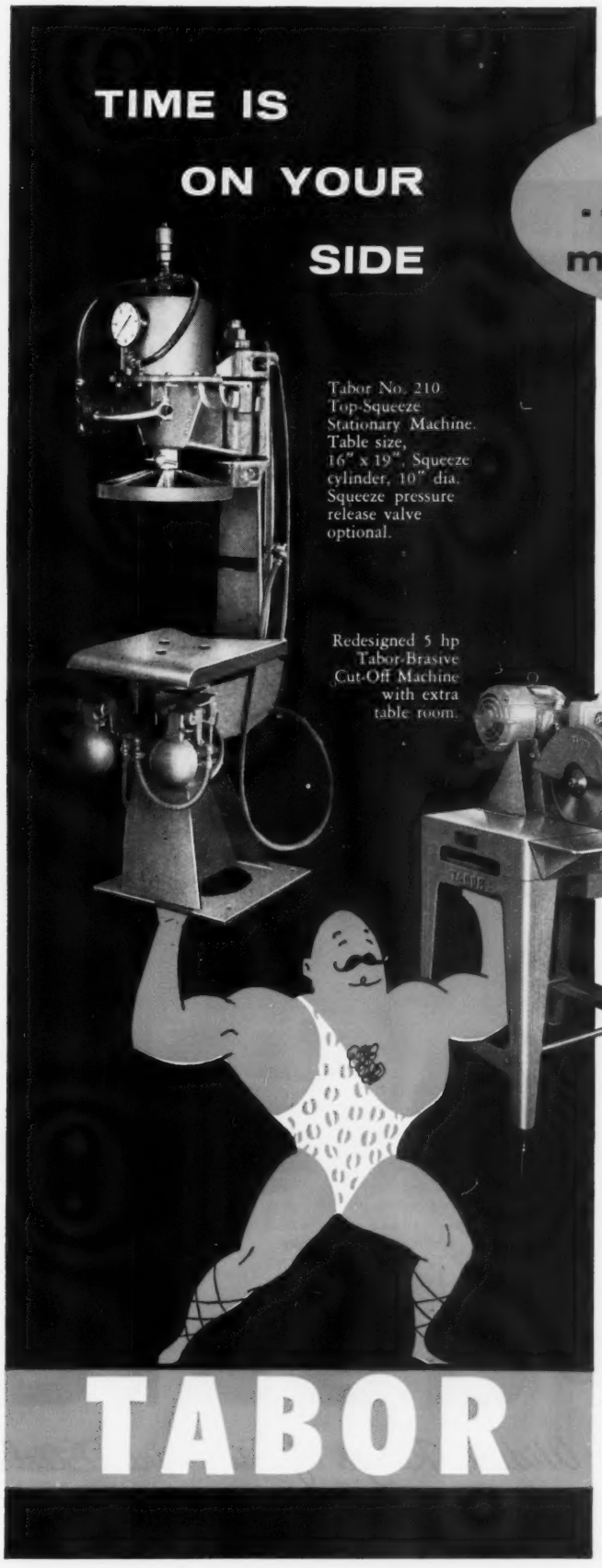
SIZES PRODUCED

Available in SAE sizes 930, 780, 660, 550, 460, 390, 330, 280, 170, 110, 70.

STANDARD ABRASIVE CO.

121 South Division St.
ANN ARBOR, MICHIGAN

Circle 589 on Inquiry Card—Page 51


TIME IS
ON YOUR
SIDE
Tabor No. 210 Top-Squeeze Stationary Machine. Table size, 16" x 19", Squeeze cylinder, 10" dia. Squeeze pressure release valve optional.
Redesigned 5 hp Tabor-Brasive Cut-Off Machine with extra table room.
TABOR

...with TABOR mechanized muscles

The new mechanized muscles built into every Tabor Molding or Cut-Off Machine mean time and money to you. They stretch production by putting time on your side . . . giving you more castings per hour, with less downtime per machine.

Tabor Molding Machines combine low first cost with ease and speed of operation, and low maintenance year-in and year-out. Scrap losses that used to be taken for granted can now be reduced. Perfect alignment between yoke and squeeze head prevents mismatches and saves metal. The completely shockless full-power jolt of the Tabor Power-Rollover Power-Draw Machine puts an end to jar-caused maintenance, not only to the machine itself but also to surrounding equipment.

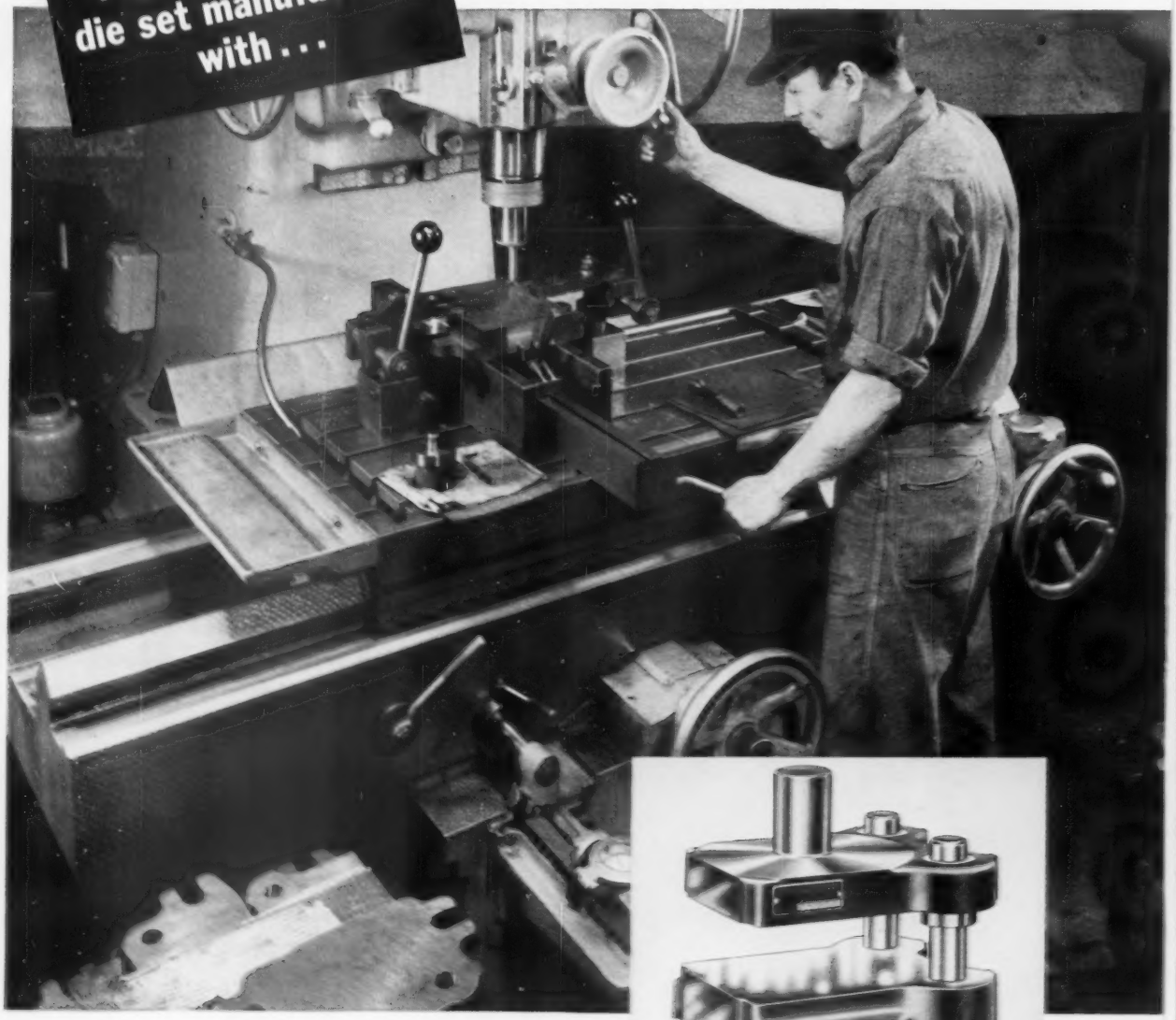
For the production foundry where mechanization is the answer to performance problems, the man to see is the Tabor Man. Call him today, or write for detailed data.

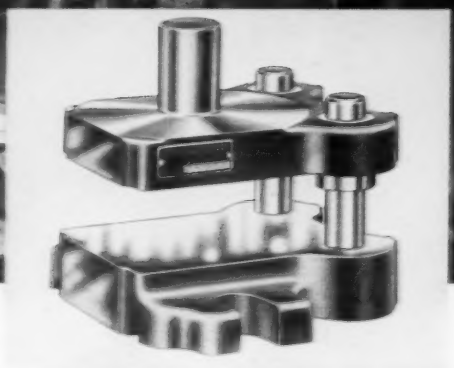
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

Chateaugay Pig Iron provides die set manufacturer with . . .

. . . Top Machinability,





Chateaugay's properties and characteristics provide Union Manufacturing Company with many advantages, including top machinability. Above, bushing and post holes are being jig bored at Union's Die Set Division.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

High Strength, Uniform Grain Structure

One of the quality products made by the Union Manufacturing Company of New Britain, Connecticut, are die sets for the metal stamping industry. These are punch holders and die holders purchased by die shops and then fitted with various types of die blocks, depending upon the nature of the part to be stamped.

The die sets are subjected to severe strain during stamping operations, and must have a very high tensile strength. They must also be accurately machined, first by Union Manufacturing Company, and later in the die shops. The grain structure must be uniform and flaw-free.

Union casts these pieces in their own foundry, and has established an enviable reputation in the industry by using Republic Chateaugay Pig Iron. The company has found that there is no better nor more economical means for insuring strong, flaw-free, easy-to-machine castings.

Chateaugay is a low-phosphorus, copper-free pig iron. Its highly uniform distribution of chemical elements produces a fine, dense, grain structure throughout every casting. This dense grain structure also provides excellent and economical machinability. Loss rate caused by flaws and porosity is held to an absolute minimum.

Other superior characteristics of Chateaugay make it ideal for a wide variety of casting applications. It is an exceptionally fluid iron—cools evenly—fills adjoining light and heavy sections completely—produces strong, sound castings accurate to patterns and shapes.

Chateaugay's year-in, year-out uniform chemistry can help you produce consistently high-quality castings. A Republic Pig Iron Metallurgist will be glad to show you how. Clip and mail the coupon today. There's no obligation.

STRENGTH AND CONSTRUCTION FEATURES of Republic Materials Handling Equipment assures long, efficient service at lowest-per-year cost. In above photo, PB-130 Box and Skid Units are used to move castings from the foundry to the production line for machining. Special units can be designed to meet your requirements. Write for facts.

STRENGTH TO WITHSTAND ENORMOUS WEIGHTS—Republic Wedge-Lock Steel Shelving is specifically designed for high stacking of such heavy items as dies, patterns, castings, etc. Joints actually grow tighter as weight increases. There's no distortion or instability. Result is efficient use of floor space plus easy rearrangement to meet future needs.

STRENGTH MEANS SAFETY when you specify Republic Chain Slings for lifting heavy and hard-to-manage materials. Republic can furnish the proper chain and fittings for all applications, in alloy or high carbon steel, and wrought iron. Republic's new chain sling catalog contains detailed information. Send coupon for your copy.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-3569
3132 East 45th Street, Cleveland 27, Ohio

☐ Please have a Pig Iron Metallurgist call.
Send more information on:
☐ Materials Handling Equipment
☐ Chain Slings
☐ Wedge-Lock Steel Shelving

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

the engineering excellence

that gave you HANDY SANDY and REDDY SANDY...

put the cost of sand conditioning and handling into a nose-dive for plants using this unique equipment. Without shoveling of any type, the Reddy Sandy separates sand from castings and cores and prepares it for the molder. Handy Sandy puts the sand overhead where it is available to the molder without effort. 30% to 70% production increases are commonplace. This same engineering excellence

U. S. FOUNDRY CO.
MILWAUKEE, WISCONSIN

...gives you better sand handling systems too

Complete Newaygo Sand Handling Systems exemplify this same type of creative engineering that lowers costs for you. They help produce more work from every foot of floor space and often eliminate several unnecessary operations that add to the cost of your castings but not to their quality. Newaygo systems take less time to install and erect as every unit is pre-assembled at the factory to save you time and money.

Formerly "The shovel gang," these 14 molders at Auburn Foundry, Inc. now spend a maximum amount of time preparing molds, and with less fatigue. Note air operated gates on hoppers that further eliminate effort on the molder's part. Cope and drag setups on system allow molds up to 30" x 33" to be produced.

Hoppers and conveyor service walkway are supported from overhead building steel structure. This feature gives unobstructed working area under hoppers and around molding machines.

Molds are handled on pallet cars through the mold storage and pour-off area. They are automatically dumped at end of lines into a vibrating pan conveyor. Pallet cars and boards are returned automatically to molder on an underneath track system.

"Foundry Business is BIG Business"

NEWAYGO engineering company

NEWAYGO, MICHIGAN

...and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 213 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

April 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

521	536	551	566	581	596	611	626	641	656	671	686	701	716	731	746	761	776	791	806	821	836	851	866
522	537	552	567	582	597	612	627	642	657	672	687	702	717	732	747	762	777	792	807	822	837	852	867
523	538	553	568	583	598	613	628	643	658	673	688	703	718	733	748	763	778	793	808	823	838	853	868
524	539	554	569	584	599	614	629	644	659	674	689	704	719	734	749	764	779	794	809	824	839	854	869
525	540	555	570	585	600	615	630	645	660	675	690	705	720	735	750	765	780	795	810	825	840	855	870
526	541	556	571	586	601	616	631	646	661	676	691	706	721	736	751	766	781	796	811	826	841	856	871
527	542	557	572	587	602	617	632	647	662	677	692	707	722	737	752	767	782	797	812	827	842	857	872
528	543	558	573	588	603	618	633	648	663	678	693	708	723	738	753	768	783	798	813	828	843	858	873
529	544	559	574	589	604	619	634	649	664	679	694	709	724	739	754	769	784	799	814	829	844	859	874
530	545	560	575	590	605	620	635	650	665	680	695	710	725	740	755	770	785	800	815	830	845	860	875
531	546	561	576	591	606	621	636	651	666	681	696	711	726	741	756	771	786	801	816	831	846	861	876
532	547	562	577	592	607	622	637	652	667	682	697	712	727	742	757	772	787	802	817	832	847	862	877
533	548	563	578	593	608	623	638	653	668	683	698	713	728	743	758	773	788	803	818	833	848	863	878
534	549	564	579	594	609	624	639	654	669	684	699	714	729	744	759	774	789	804	819	834	849	864	879
535	550	565	580	595	610	625	640	655	670	685	700	715	730	745	760	775	790	805	820	835	850	865	880

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CITY ..... ZONE.....

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April 1957

SIMPLY CIRCLE AD ITEM NUMBER BELOW

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529	544	559	574	589	604	619	634	649	664	679	694	709	724	739	754	769	784	799	814	829	844	859	874
530	545	560	575	590	605	620	635	650	665	680	695	710	725	740	755	770	785	800	815	830	845	860	875
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534	549	564	579	594	609	624	639	654	669	684	699	714	729	744	759	774	789	804	819	834	849	864	879
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PRODUCT MANUFACTURED .....

FOUNDRY

Reader Information Service

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 213 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FIRST CLASS
Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

—4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

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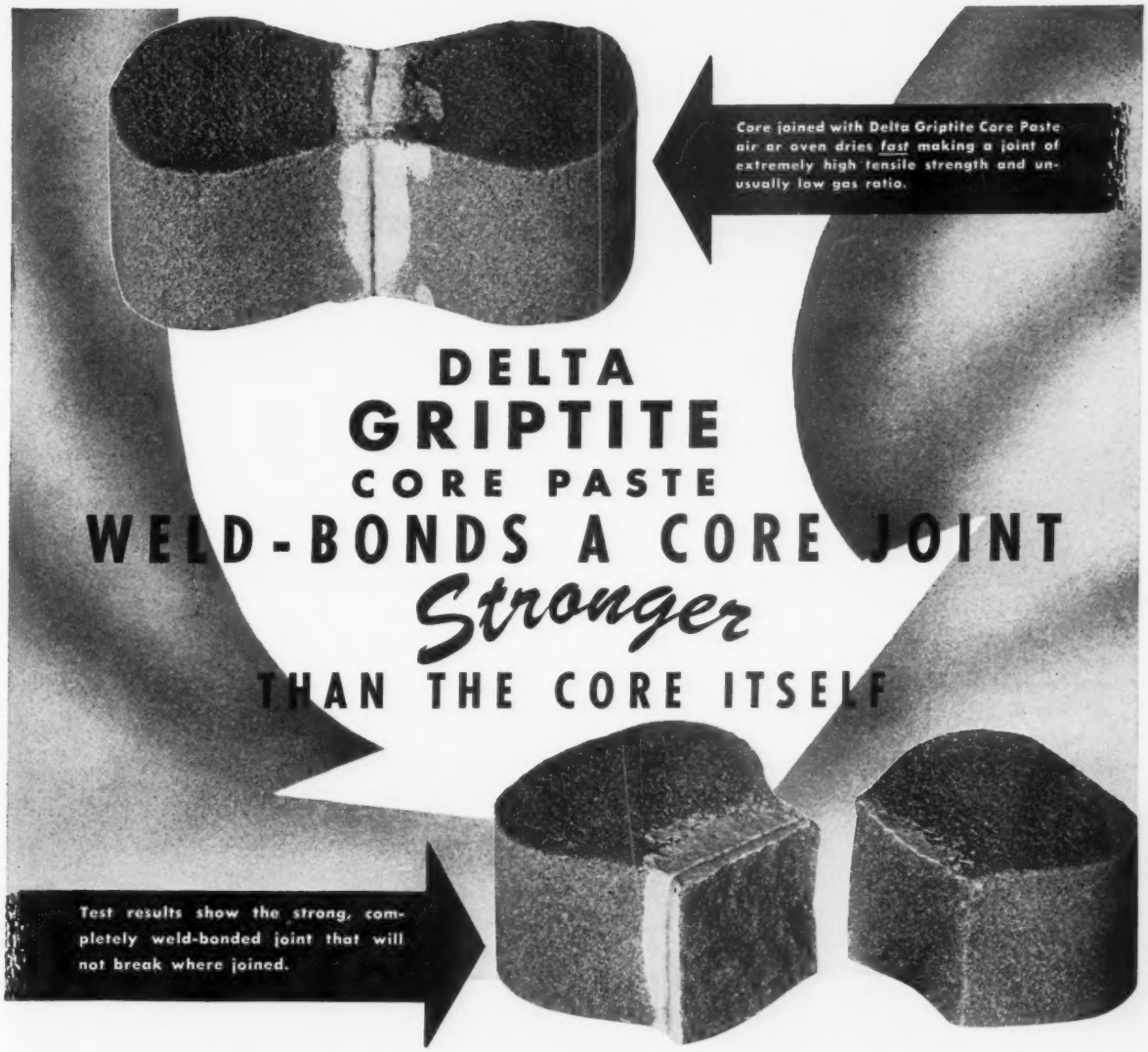

Core joined with Delta Griptite Core Paste air or oven dries fast making a joint of extremely high tensile strength and unusually low gas ratio.
DELTA
GRIPTITE
CORE PASTE
WELD-BONDS A CORE JOINT
Stronger
THAN THE CORE ITSELF
Test results show the strong, completely weld-bonded joint that will not break where joined.

New Delta Griptite Core Paste penetrates deep into core surfaces to produce a welded bond of sand many times *stronger* than the core itself. Cores joined with Delta Griptite Core Paste will not break or fracture at the joint.

Delta Griptite Core Paste has a low gas ratio which eliminates the possibility of paste blows. It contains no low fusion materials, is completely stable and is non-reactive with molten metals. It is easy to mix, air or oven dries quickly and, when dry, is resistant to moisture pickup.

Available in 100 lb. paper bags or 400 lb. (net) lined wood barrels.

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

For Maximum Control and Efficiency . . .

FAST INDIRECT ARC MELTING, ROCKING ACTION PRODUCE CLOSE QUALITY CONTROL AT LOW OPERATING COST

Detroit Electric Furnaces offer three basic advantages for metal melting: Indirect arc heat for uniform high quality; controlled rocking action for maximum heat utilization and homogeneous alloy mixture; and quick shell interchange for economical melting of different alloys.

Close Control of Analysis

By using an indirect arc in a sealed chamber, Detroit Electric Furnaces produce alloys of consistent analysis through heat after heat. Electrodes remain clear of the molten bath at all times. The sealed chamber holds gaseous contamination to a minimum. Melting is rapid, yet final pouring temperature can be duplicated or varied at will.

Double Economy with Rocking Action

Automatic rocking action washes the metal over a greater surface of the lining. This provides fast, efficient metal melting and stirs the bath constantly to assure homogeneity of the metal. Rocking action prolongs lining life by preventing excessive refractory temperatures. The optimum melting cycle for any particular heat can be determined then preset with the rocking controller.

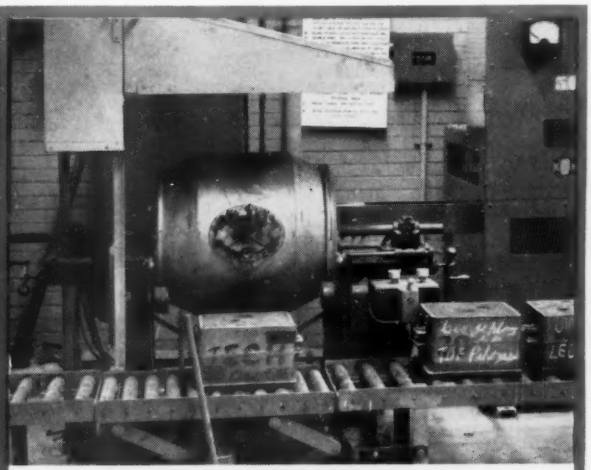
Vary Production Schedules, Melt Different Alloys Easily

Detroit Electric Furnaces are designed to meet diversified melting requirements as well as long run schedules. Using the size furnaces suited to your production volume, a wide range of ferrous and nonferrous alloys can be handled with quickly interchangeable shells. This greatly lowers your initial investment.

Send us your operating data and our engineers will show you how Detroit Electric Furnaces can best meet your needs. Write today, or mail the coupon on the opposite page for full catalog information.

Type AA—1500 lbs. capacity

Produces 5-8 tons of metal per 8-hour shift. Pedestal-mounted electrodes with automatic arc control. Conical or cylindrical shell. 250 k.w. (brass) or 400 k.w. (iron) transformer.



Types GMS/GMT—60/100 lbs. capacity

Ideal for research and limited production. Type GMS-30 k.w. produces 800 lbs. per shift. Type GMT-50 k.w. produces up to 1200 lbs. Base-mounted electrodes. Single transformer and meter cabinet.

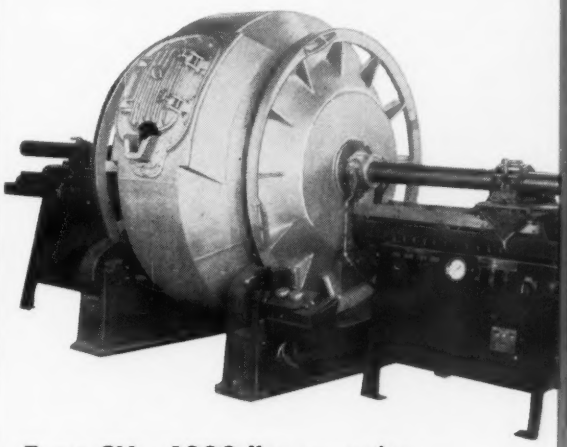
DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company

Bay City, Michigan

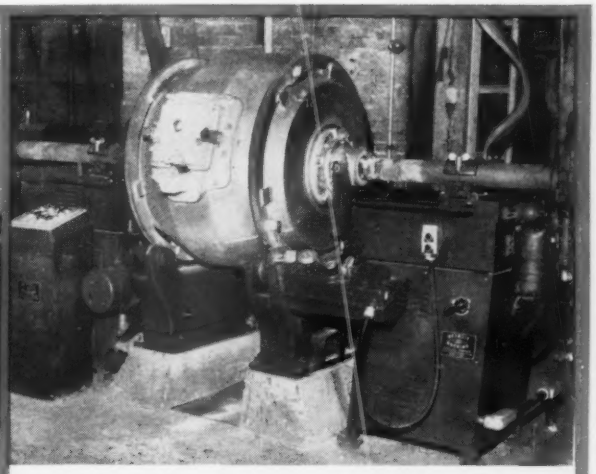
Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Elsa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

Melt with Detroit ROCKING Electric Furnaces



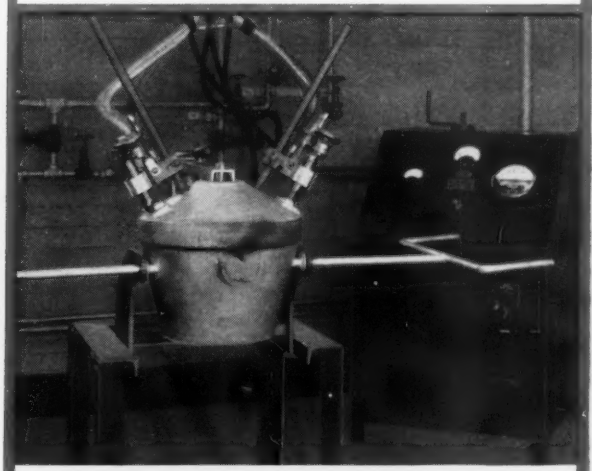
Type CM—4000 lbs. capacity

Produces 10-16 tons of metal per day. Pedestal-mounted electrodes. Conical or cylindrical shell. 400 k.w. (brass), 600 k.w. or 750 k.w. (iron) transformers. Also available: Type CC, 3000 lbs. capacity, rated at 350 k.w. or 600 k.w.



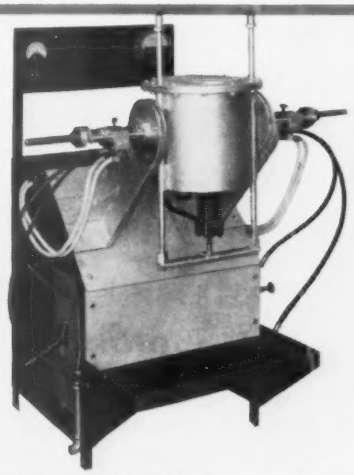
Type LFNP—500 lbs. capacity

For 2-4 tons of metal per shift. Pedestal-mounted electrodes. Conical shell. 175 k.w. transformer. Also available: Type LF-100 k.w., 200 lbs.; Type LFC-125 k.w., 350 lbs.; Type LFY-175 k.w., 700 lbs.



Type PT—15 lbs. capacity

Pot-tilting type for research and small production. Electrodes mounted in cover. Pot doubles as crucible. Single power unit has 12 k.w. transformer.



Type IC/ID—10/20 lbs. capacity

Investment casting type for precision castings. Type IC rated at 12 k.w., Type ID at 20 k.w. Furnace inverts to pour into attached mold.

FREE CATALOG

Detach and mail coupon for full information on Detroit Electric Furnaces.

Detroit Electric Furnace Division
Kuhlman Electric Company
Bay City, Michigan

Please send me a copy of your catalog No. 559 plus specific information on the Detroit Electric Furnaces checked at right.

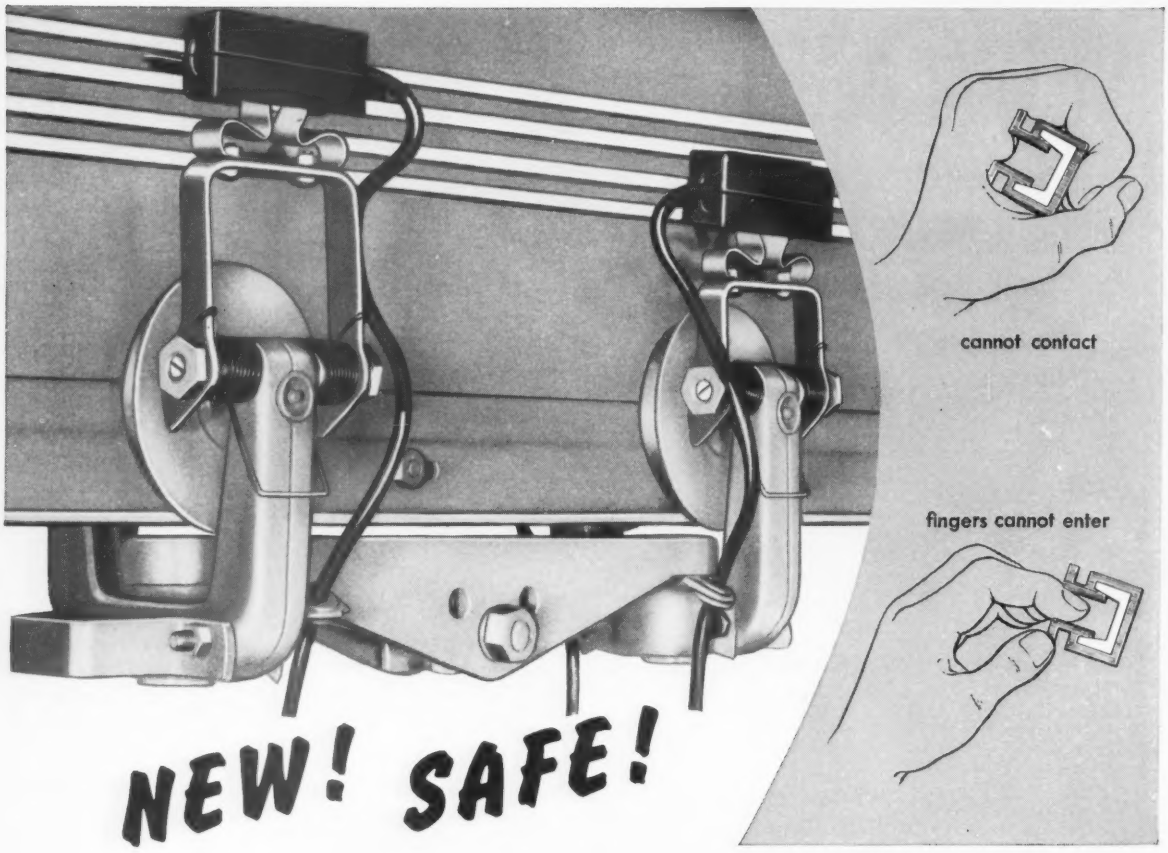
Name_____ Title_____

Company_____

City_____ Zone_____

State_____

- ☐ AA
- ☐ CM
- ☐ LFY
- ☐ GMS
- ☐ PT
- ☐ IC



NEW! SAFE!

AMERICAN MONORAIL

KANT SHOCK

SHIELDED ELECTRIFICATION

For Monorail Track and Crane Systems

By covering its standard bus bar electrification with a specially designed polyvinyl chloride extrusion, American MonoRail now furnishes completely safe electrified systems.

This KANT-SHOCK shielding absolutely prevents accidental contact with live bus bars. It is impossible for an adult's finger to enter the shield.

A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of any misalignment due to bent bars or at switch and inter-lock connections.

KANT-SHOCK Electrification positively eliminates all the hazards of open bar conductors — prevents costly accidents — protects employees—reduces insurance rates.

Write for KANT-SHOCK Bulletin KS-1

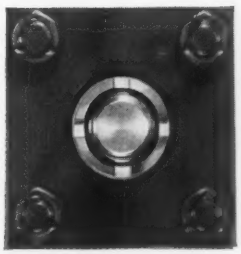
Member of Materials Handling Institute and Monorail Manufacturers Association

For Power Driven Conveyors, Use Landahl Chainless Conveyors

AMERICAN MONORAIL COMPANY

OVERHEAD HANDLING EQUIPMENT

13104 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)



Here are the world's finest power cylinders

...competitively priced!

This ad is written for the man who has thought all cylinders are "pretty much alike." That just isn't so, and your Hannifin man would like an opportunity to show you why...

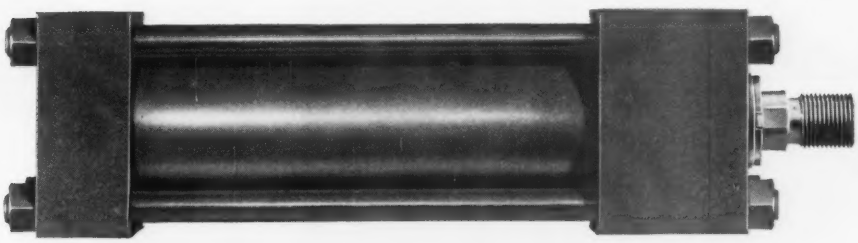
He'll show you design features that other cylinders simply do not have... extra quality workmanship at critical points that pays off in longer life ...accessibility that simplifies their infrequent maintenance. And when he talks price and delivery, you will find these better features cost you no more, can often be delivered sooner.

We think you'll agree that it pays to standardize on Hannifin cylinders.

AIR AND HYDRAULIC

HANNIFIN

POWER CYLINDERS

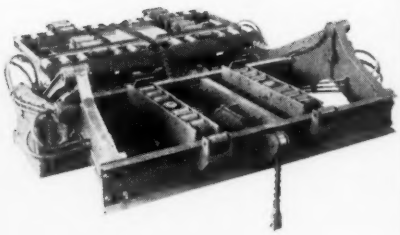


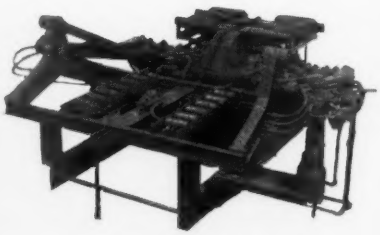
COMPLETE CYLINDER FILE

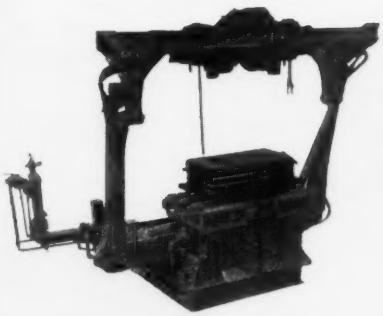
Write for your copy of this new Hannifin Cylinder File . . . complete, easy-to-use, easy-to-order-from information on five lines of Hannifin Cylinders. Write Hannifin Corporation, 637 S. Wolf Road, Des Plaines, Ill.

Circle 597 on Inquiry Card—Page 51

Third of a series . . .
the charging conveyor rollover
and draw machine







why foundrymen buy a HERMAN molding machine

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA

This machine, produced in a broad range of 500 to 20,000 lb. rollover capacities, is the ideal answer to your demand for a machine to do short-run work.

It's an economical operating unit. It has a high degree of flexibility. A tremendous range of sizes and types of work can be produced.

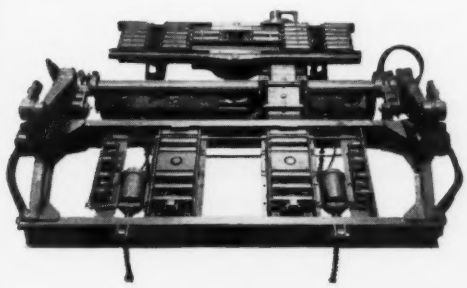
The Herman Charging Conveyor Machine can be used for either cores or molds.

HOW IT WORKS

1. Core box filled with sand and placed on the jolt unit.
2. Power lift conveyor lowers box on sub-plate.
3. Core box is jarred and elevated by power lift conveyor to standard conveyor level.
4. Box goes to Charging Conveyor Rollover and Draw Machine manually or by pusher mechanism.
5. Pneumatic core box and core plate clamps engage rammed core box for rollover operation.
6. After rollover, core clamps are disengaged and slow draw operation starts.
7. Vibrators separate bond between core box and sand.
8. Fast draw operation checked by speed control device, and core box gently deposited direct on discharge conveyor, then rolled away on companion conveyor.
9. Inverted turnover plate and core box rolled back to upright position, pneumatic clamps disengaged, and box returned to either jolt station or storage.
10. Another rammed core should, of course, now be at the Charging Conveyor Rollover and Draw Machine for the production of another core.

It will pay you to look further into some other reasons why foundrymen buy this particular Molding Machine.

Just call or write us today . . . about this, or any other Herman Machine; they're made in all types and sizes, to fit all foundry operations.



FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

HERMAN

Best Known Name in Molding Machines

AUTOMATIC AIR-TO-AIR CONTROL assures

#21 Type "C" Airomatic
Automatic Drag Molding Unit

Heavy Duty Jolt & Power Squeezer Drag Molding Machine with Pneumatic Pattern Draw. Equipped with air operated car type squeeze head and built-in flask roll-in and mold roll-out device with measuring sand hopper, flask indexing device and sand spill upset, flask feed-in elevator, mold turn-over and mold transfer.

uniform jobs
dependable jobs
better jobs
at less cost

in the
NEW

NICHOLLS AIROMATIC

AUTOMATIC MOLDING MACHINES

There is nothing to get out of order — no limit switches, no electrical timers, no electric pressure switches, no electrical latch relays.

With simple, reliable "push-button" operation the new Nicholls Airomatic utilizes the driving force of the machine itself to make, close, remove and return **high-quality** sand molds **in quantity . . . automatically . . . consistently . . . continuously.** No guesswork, no wasted materials, no lost manhours, no bottlenecks.

Look at **your** equipment **today.** Whatever your molding requirements, there's a Nicholls machine to fit the job. For information, call or write

WM. H. NICHOLLS CO., INC.
Richmond Hill 18, Long Island, N. Y.

NICHOLLS

• FOR HALF A CENTURY THE BEST IN MOLDING EQUIPMENT

Vacuum melting was built around an Ajax induction furnace

Vacuum melting, as we know it today, combines "ideal" vacuum equipment with an induction furnace. But in 1920, Ajax **had** the induction furnace, and decided not to wait for the "ideal" vacuum. In that year, Ajax supplied vacuum furnaces with capacities up to five pounds to the National Bureau of Standards and others. As vacuum equipment improved, capacity rose. And by 1941 Ajax had supplied the National Bureau of Standards and several manufacturers with 100 lb. capacity vacuum furnaces. Further strides in vacuum technology made it feasible in 1946 for Ajax to supply the United States Government with 500 lb. capacity furnaces for atomic work . . . and to this date it continues to supply these and larger furnaces for the same kind of work. Today, vacuum equipment is closing the gap. But it is significant that of all the vacuum melting installations of the past ten years, the majority have been built around Ajax-Northrup induction furnaces and controls.

The fascinating history of induction heating and its unique application to melting, forging, and heating operations throughout industry are told in a new book. Write Ajax Electrothermic Corporation, Trenton 5, New Jersey, for your copy.

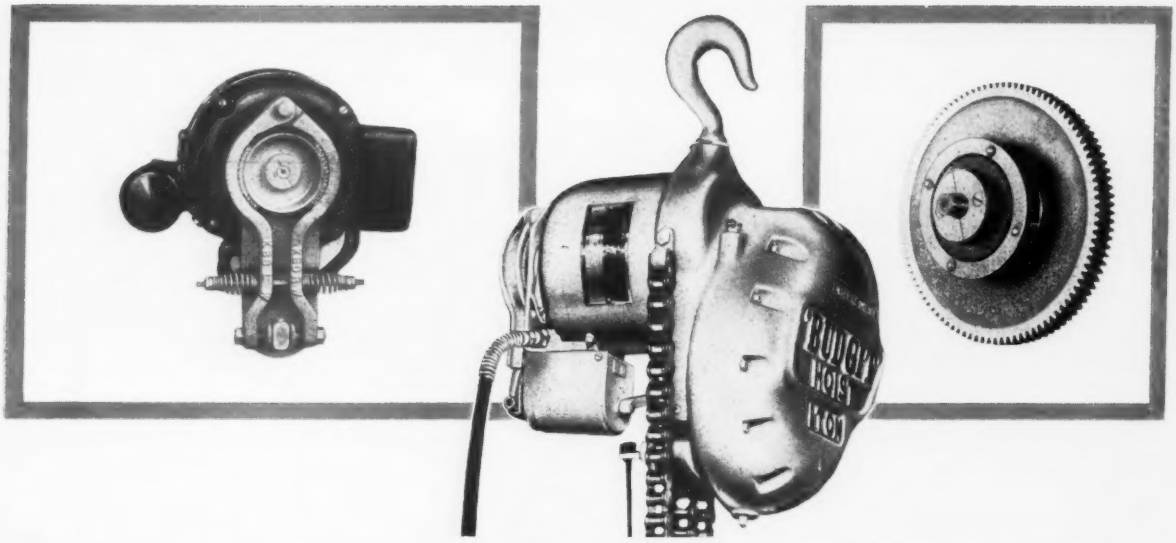
Induction heating melting

AJAX

NORTHRUP

Vacuum metallurgy is just one of the many industries which owe their existence to Ajax-Northrup induction heating.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY—AJAX ENGINEERING CORPORATION



POWERFUL TWO-BRAKE HOIST

gives you greater SAFETY plus "hairline" stops and starts

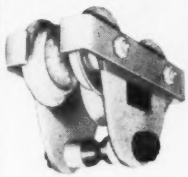
The 'Budgit' Electrical Hoist has a motor brake and a load brake. They operate simultaneously, automatically. Each alone is strong enough to hold the full load safely. Braking action is so quick, load-spotting time is greatly reduced.

The 'Budgit' is easy to operate with one hand. The other hand is always free to guide the load. You get fast Hoisting. A 500-lb. load can be lifted 1 foot in less than 2 seconds. Less hoisting time means less idle time for production machines. More units can be processed per day.

Installation is no problem. Just hang up, plug in and the 'Budgit' is ready to work and save for you. It uses only a few cents' worth of electricity a day; requires very little maintenance.

Ruggedness, efficiency, safety and economy have made the 'Budgit' Electric Hoist the most widely used hoist in the world. Capacities: ⅛ to 2 tons. AC and DC models; also 12-volt battery-operated models for use on trucks. Prices start at $149. *Ask your "Shaw-Box" Distributor for details or write us for Bulletin 402.*

FOR GREATER CONVENIENCE, USEFULNESS



I-Beam Trolley adds travel-ability to any hoist. Bearing-equipped wheels roll smoothly. Fit various size I-beams. Capacities ¼-ton up. Priced from $19.50.

Chain Container collects 'Budgit' tail chain neatly—keeps it up out of the way. Holds up to 25 feet of chain. No drilling, no machining to install. Priced from $17.00.

'Budgit' Cord Reel. Keeps conductor cord taut. Cord may be led off in any direction. Useful on any hoist or other motor device up to 1 HP. 25 and 50 foot cords. Priced from $74.50.

57A-9

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'Budgit'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

386 West Broadway • Muskegon, Michigan

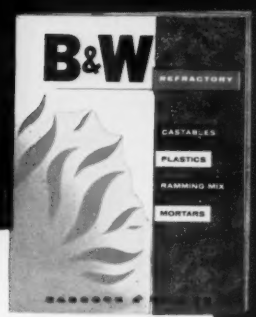
Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

What are your refractory castable problems ?

- High Temperatures?
- Abrasion and Erosion?
- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.



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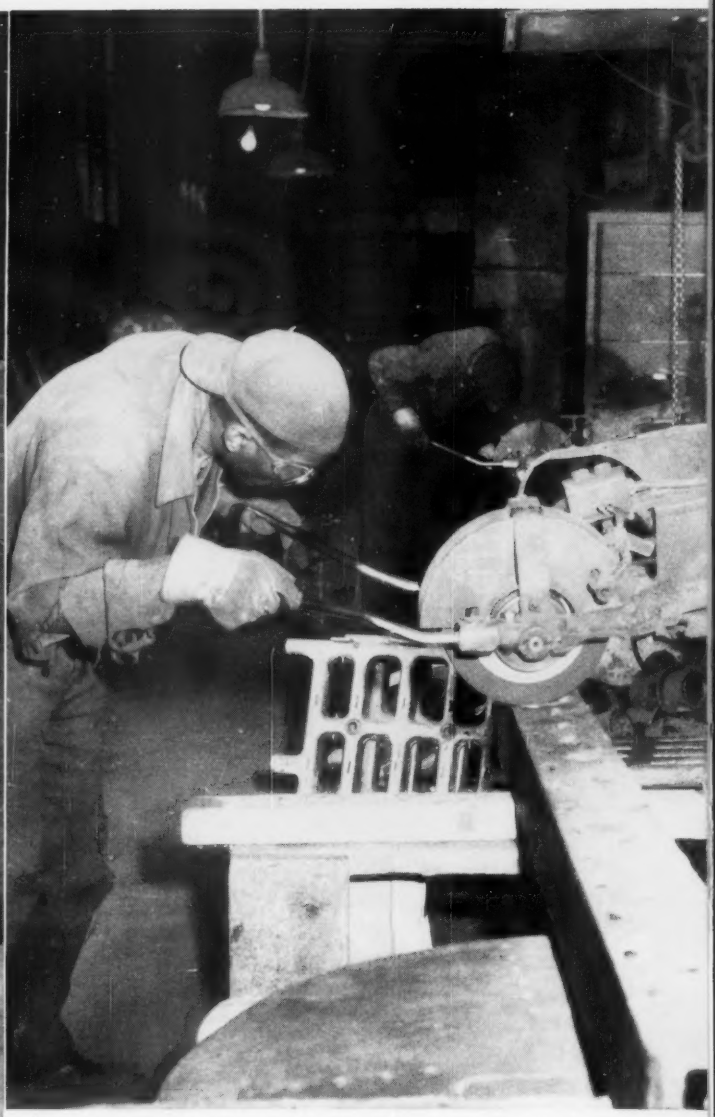
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide

Circle 602 on Inquiry Card—Page 51

ALLOY GRINDING in a PROGRESSIVE FOUNDRY



Cleaning Room Foreman Charles Karr is proud of his department's record in safety, production, and costs.

Swing frames snag the larger castings. Alloy foundrymen will recognize the absence of sparks on these tough metals.

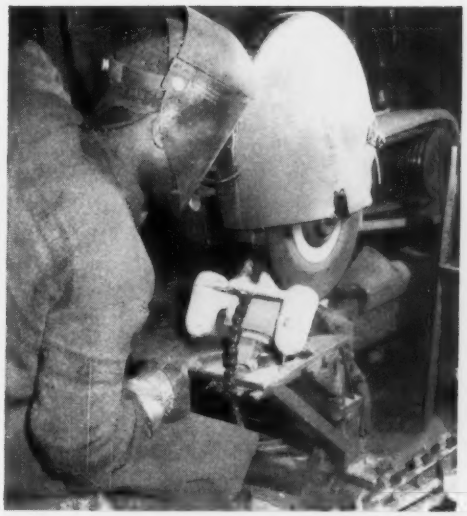
Bay State Grinding Wheels Help Keep Cleaning Costs Low at General Alloys Company

Casting alloy metals for America's food-processing, chemical, oil, and heat treating industries is the business of General Alloys Co., South Boston, Mass.

The metals they pour are tough ones: stainless, as well as the special alloys developed to resist heat, acids, and other chemicals. Because each is also a tough metal to grind, cleaning costs are an important cost factor. This makes the life and cutting qualities of grinding wheels especially critical in selecting the right wheel for each job.

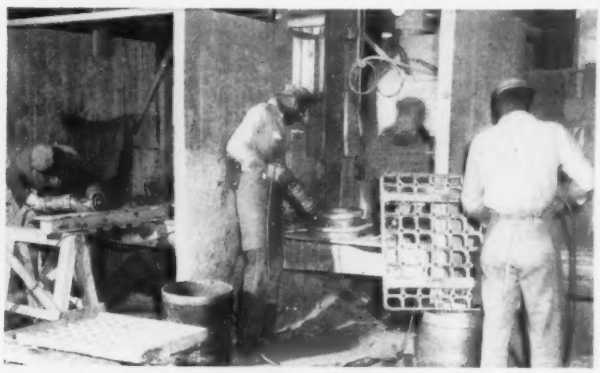
Because its cleaning room demands dependable abrasive products and engineering service covering all phases of foundry grinding, General Alloys Company has used Bay State as a principal supplier for many years.

A call to any Bay State distributor or branch office will bring the same capable abrasive product service to your foundry . . . or write direct to the Westboro plant.



Cut-off wheels also have tough assignments on these alloy metals. Note air-operated chain clamp for safety.

Small swing frame grinder, with 12″ x 2″ wheel makes fast work of odd shaped parts locked in adjustable air vise.



Separate booths accommodate portable grinding of intricate parts. Some use 7″ and 8″ straight wheels on high-cycle grinders. Others use mounted wheels and 2½″ x ⅜″ resinoid wheels.

Double and single head pedestal grinders with 16″, 20″, and 30″ wheels handle the bulk of the smaller alloy castings.

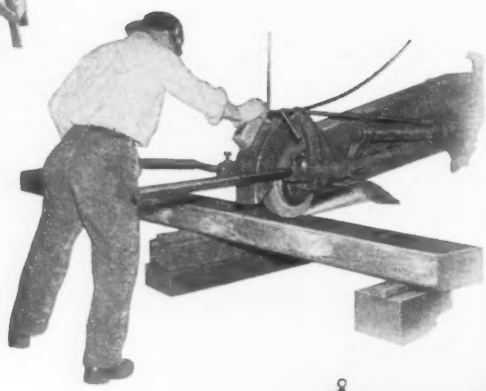
BAY STATE ®
WHEELS of PROGRESS

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses: Bristol, Conn., Chicago, Ill., Cleveland, Ohio, Detroit, Mich., Pittsburgh, Pa.
Distributors — All principal cities • In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ont.

Circle 603 on Inquiry Card—Page 51

Progress Means a Better Way of Doing Things...



Mid-West Abrasive
Patented Automatic Billet Grinder

...and Progressive Thinking by Mid-West has made the difference

It's a big step from the old foot-treadle grinding wheel to the hand-operated swing frame grinder. But: it's an even bigger step from the swing frame grinder to Mid-West's Automatic Grinding Machine, which today is reducing costs and increasing production in grinding operations at steel mills throughout the country.

Yet, progress such as this is a normal outgrowth of vigorous research engineering and development at Mid-West Abrasive, where "Progressive Thinking" dictates that normal progress is no longer adequate to meet today's highly competitive conditions. The result: highly skilled engineers and technicians are constantly developing newer products and maintaining top quality in all Mid-West products.

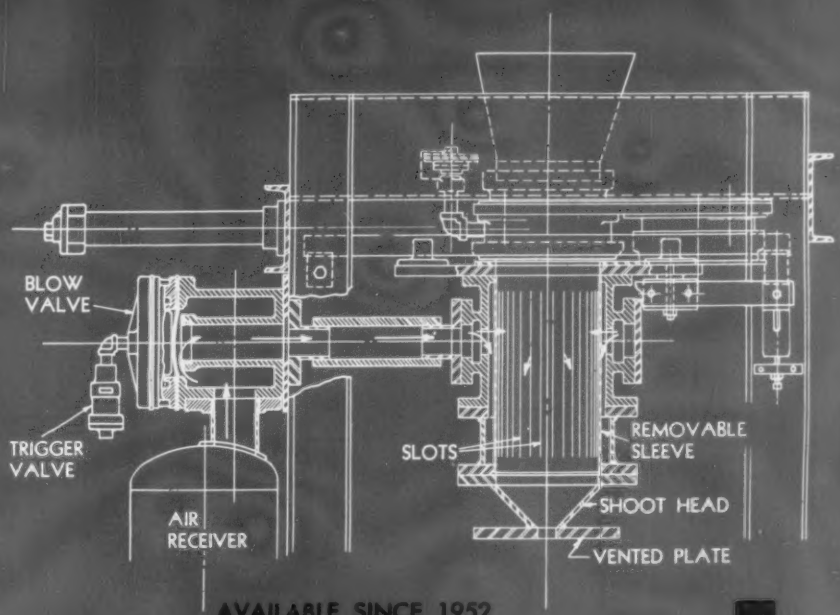
Discover what "Progressive Thinking" can do for you. Write for the name of your Mid-West representative. Get the story on the Mid-West line of grinding wheels, coated abrasives, honing stones, and abrasive grains.

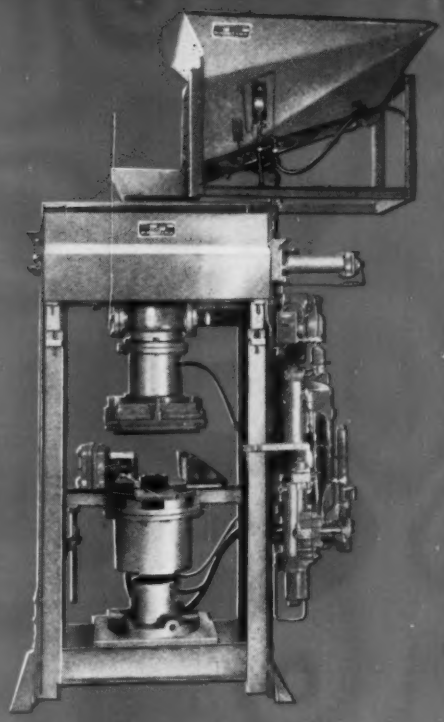
Mid-West wants to be more than just another source . . .
we want to be your working partner on all your abrasive needs.

MID-WEST ABRASIVE CO.

MID-WEST QUALITY ABRASIVES

Executive Offices:
510 S. Washington St.
Owosso, Michigan





AVAILABLE SINCE 1952

#101-EO DEMMLER CORE BLOWING MACHINE

This machine may be used for shooting cores by substituting a shoot head for the standard blow plate.

Best quality cores are often produced by the time tested blowing method, and when it is preferred to use the machine as a blower the change can be made quickly and conveniently.

These are the same type machines as the successful Demmler mold blowers which have been breaking molding records for the past three years.

Yes, you can have a machine that gives you complete flexibility, to blow or shoot as you choose. Write us for complete data on this Demmler 101-E machine.

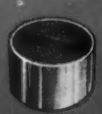
DEMMLER

FIRST NAME IN CORE BLOWERS

ONE MACHINE DOES BOTH ..... BLOWS OR SHOOTS CORES

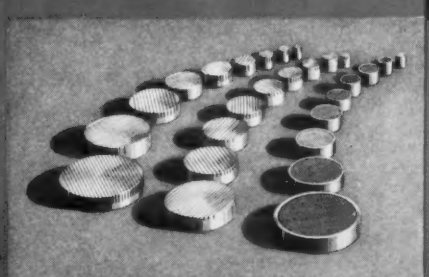
PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.



NEW HL 160 Mesh Vents

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.



DEMMLER MANUFACTURING CO.

KEWANEE, ILLINOIS

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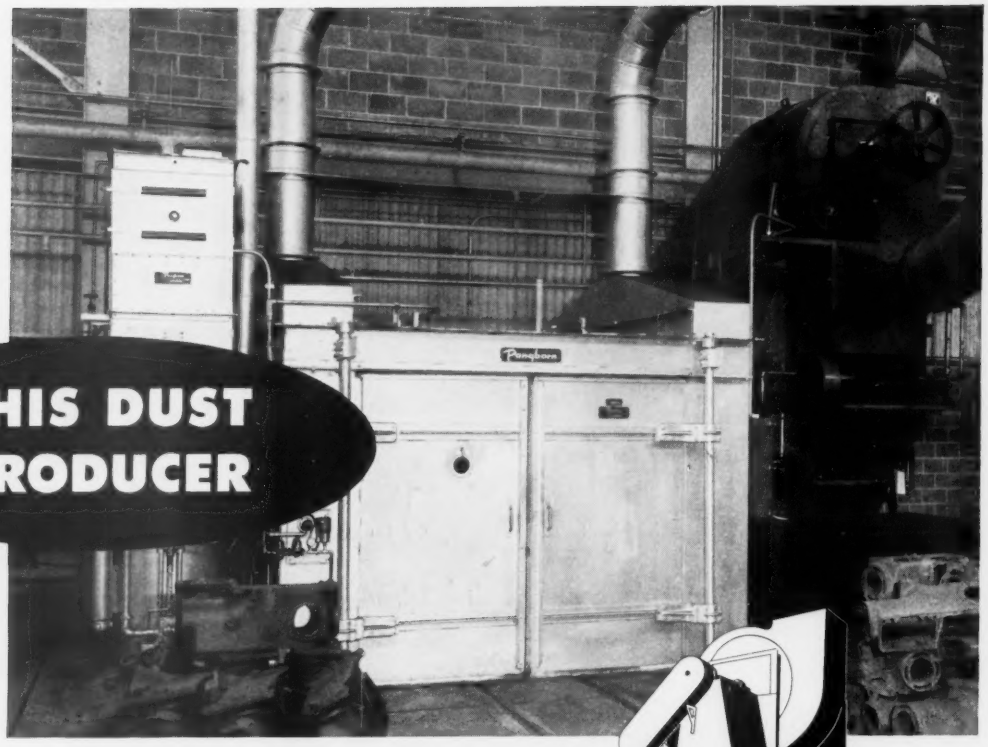
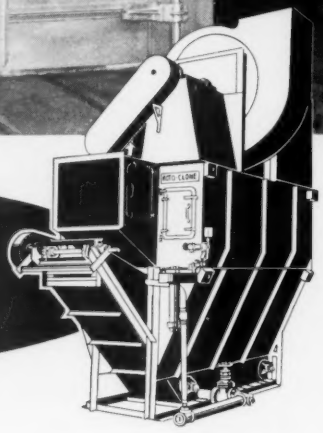


THIS DUST PRODUCER

meets its master in THIS DUST COLLECTOR



AAF Type N ROTO-CLONE keeps abrasive cleaning clean!

Dust storms created by abrasive cleaning are snuffed out efficiently and economically by the AAF Type N ROTO-CLONE. In air or airless blasting (of burned sand or scale—with sand, shot or grit) the Type N wet collector is the answer.

The high cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. There's no secondary dust problem either, and its compact design makes for important space savings.

For complete product information on the Type N ROTO-CLONE, call your local AAF representative or write direct for Bulletin 277.

AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Herman Nelson Portable Heaters

Illinois Heating Specialties

BETTER AIR IS OUR BUSINESS

AAF Electric Furnace Hoods

AAF Type K Exhauster

Circle 606 on Inquiry Card—Page 51

Circle 607 on Inquiry Card→

IMPORTANT: For your convenience this sheet is perforated. Tear it out and "buck-slip" it to the proper man in your plant.

THE NEW B7 Snagging Wheel by Carborundum is tough and sharp. It's ideal for rugged foundry jobs on high-tensile materials. Check its performance in the report on the other side of this page.

Photo courtesy Atlas Steel Casting—Buffalo, N. Y.

Ask the man from **CARBORUNDUM** REGISTERED TRADE MARK **BONDED ABRASIVES DIVISION**

Also makers of a complete line of Coated Abrasives and Abrasive Grain

ATTENTION CLEANING ROOM FOREMAN: Turn the page and see the Product Performance Report prepared especially for you.

Product Performance Report

SNAGGING STEEL CASTINGS

Operation

Removing torch cuts, parting lines and surface irregularities on steel castings. Machine used for test: Fox single head stand grinder and 24 x 3 x 12 Resinoid bonded abrasive wheel.

Project

1. Obtain lowest cost per pound metal removed.
2. Obtain fast cutting action.

Material for Test

Select castings of uniform production run.

Method

Weigh wheel and castings before and after grinding.
Obtain contact time wheel to metal.

Results

Best abrasive wheel found for this operation A143-Q-B7.

Contact time	1 hr. 34 min.
Wheel loss	4.5 lbs.
Metal removed	91 lbs.
Lbs. removed per contact hr.	58
Abrasive cost per lb. removed	.024

No dressing required.

Note

Carborundum, leader in abrasive techniques, backs up its products with trained sales representatives, a staff of competent field engineers and an abrasive engineering laboratory ... all available to you to put more sense in your abrasive dollar.

Here is another in the series of Product Performance Reports being released by the Bonded Abrasives Division of The Carborundum Company. A color photograph of this actual operation is shown on the back of this page.

• *Ask your local distributor... or the man from*

CARBORUNDUM
REGISTERED TRADE MARK

7810 PRINTED IN U.S.A.

Perfect Inoculants for Ductile Irons!

VANCORAM NODULOY® ALLOYS —AND INOCULOY®

Two new additions to the Noduloy family mean even greater efficiency and performance!

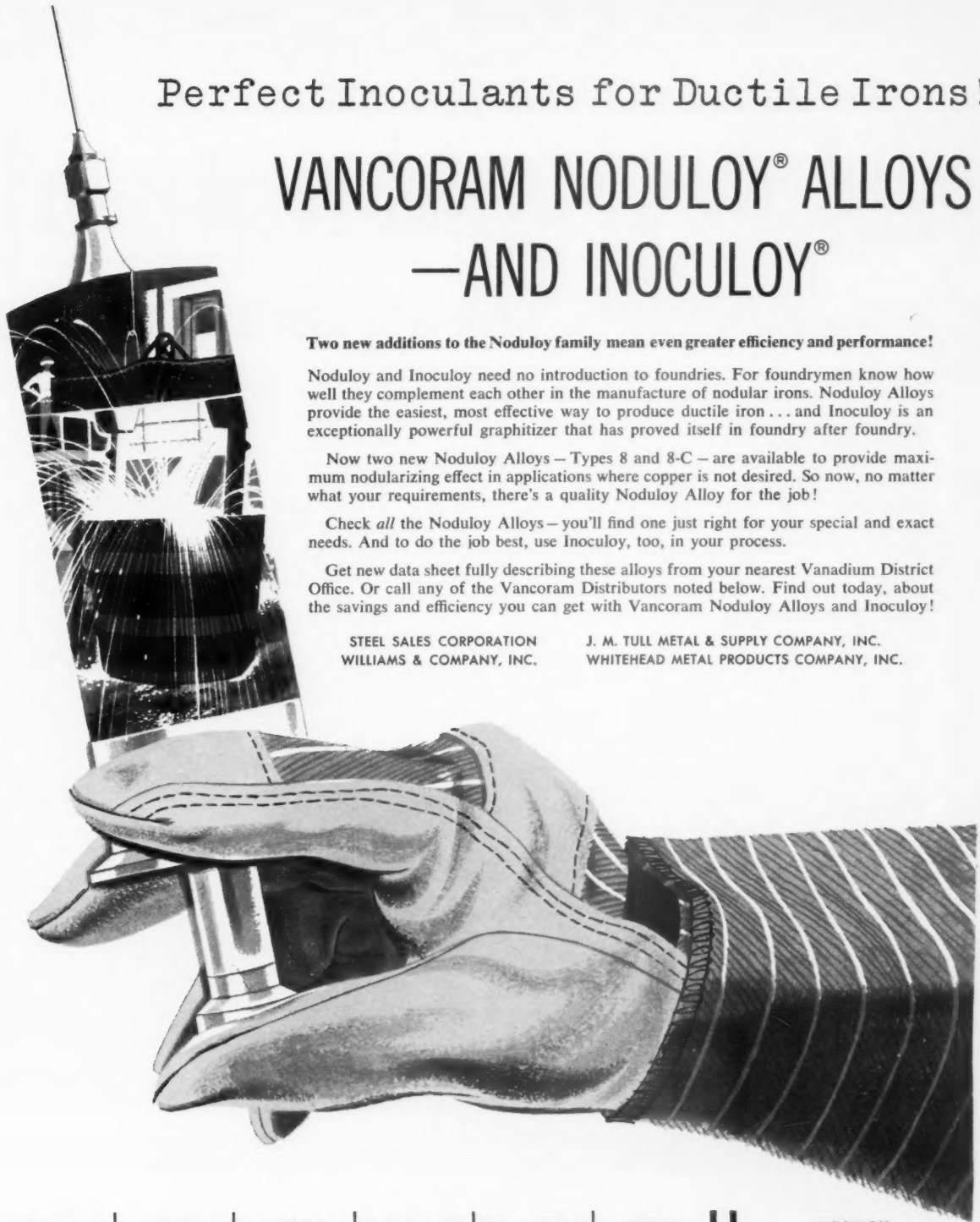
Noduloy and Inoculoy need no introduction to foundries. For foundrymen know how well they complement each other in the manufacture of nodular irons. Noduloy Alloys provide the easiest, most effective way to produce ductile iron . . . and Inoculoy is an exceptionally powerful graphitizer that has proved itself in foundry after foundry.

Now two new Noduloy Alloys – Types 8 and 8-C – are available to provide maximum nodularizing effect in applications where copper is not desired. So now, no matter what your requirements, there's a quality Noduloy Alloy for the job!

Check *all* the Noduloy Alloys – you'll find one just right for your special and exact needs. And to do the job best, use Inoculoy, too, in your process.

Get new data sheet fully describing these alloys from your nearest Vanadium District Office. Or call any of the Vancoram Distributors noted below. Find out today, about the savings and efficiency you can get with Vancoram Noduloy Alloys and Inoculoy!

STEEL SALES CORPORATION
WILLIAMS & COMPANY, INC.
J. M. TULL METAL & SUPPLY COMPANY, INC.
WHITEHEAD METAL PRODUCTS COMPANY, INC.



NODULOY	TYPE 7	TYPE 7-C	NEW! TYPE 8	NEW! TYPE 8-C	TYPE 12	INOCULOY	
MAGNESIUM	7.5/9.5%	7.5/9.5%	7/9%	7/9%	10.5/13%	SILICON	80/90%
SILICON	43/47%	43/47%	44/48%	44/48%	37/41%	CALCIUM	min. 0.50%
COPPER	4.5/6.5%	4.5/6.5%	—	—	15/18%		
CERIUM	—	.45/.60%	—	.50/.70%	—		

VANCORAM

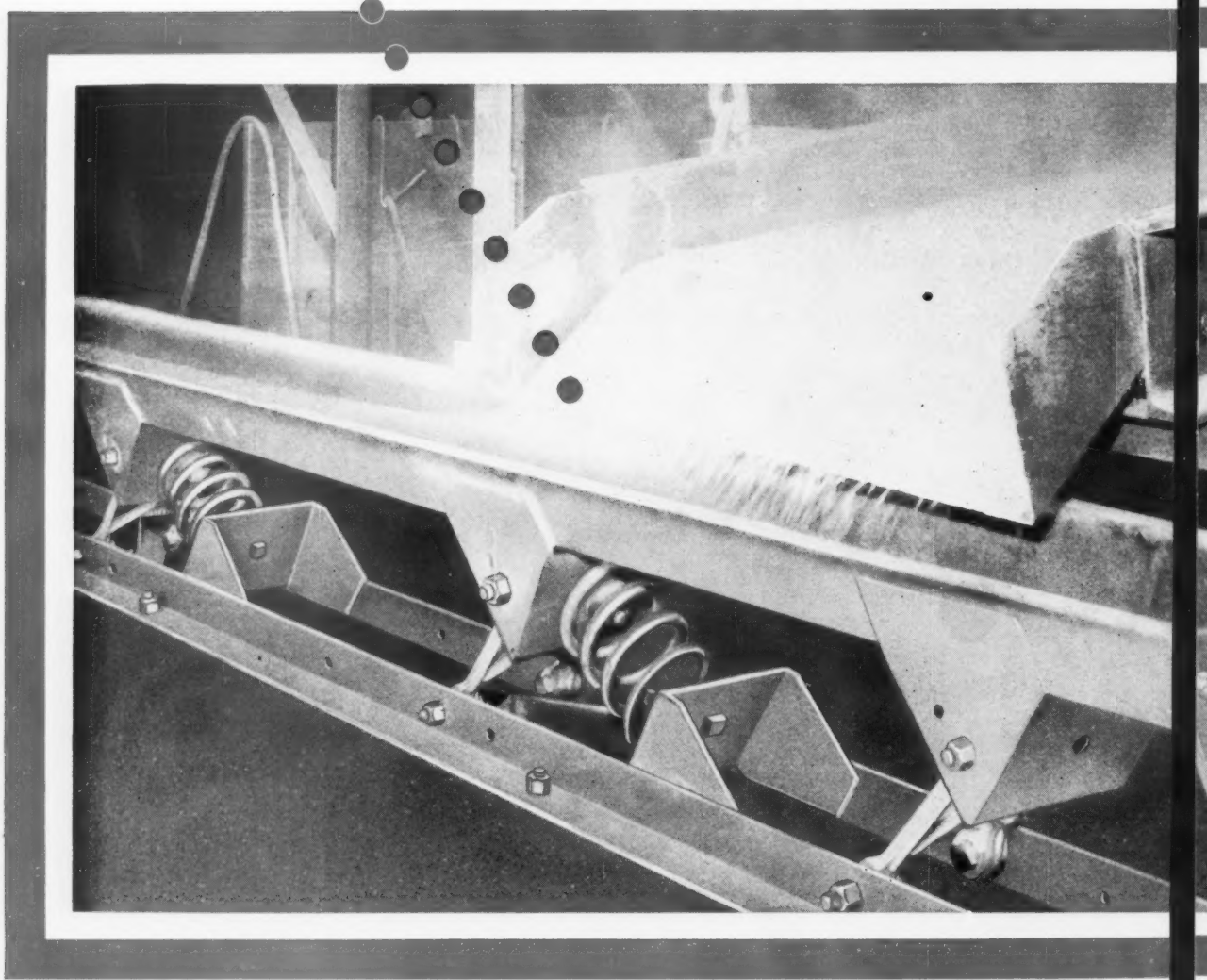
VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y. • Chicago • Cleveland • Detroit • Pittsburgh

Producers of alloys, metals and chemicals

Circle 608 on Inquiry Card—Page 51

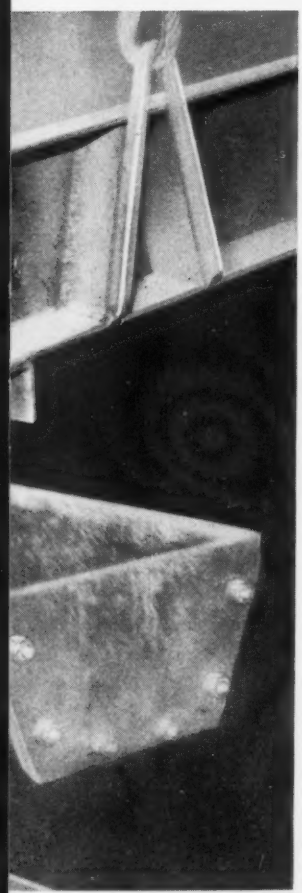
HERE..in new Coilmount oscillating conveyors–LINK-BELT combines and natural



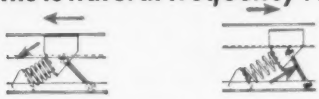
RESULT: smooth, continuous material flow without dampening...even under surge loads

Coilmount's power-saving principles bring you new, low-cost materials handling efficiency for medium-duty applications . . . materials ranging from dust to lumps the width of conveyor trough. Compactness saves space . . . trough can be adapted for screening, drying, cooling or other processing operations. And completely assembled sections from stock offer important installation savings. Choose from 5 or 10-ft. lengths with 10 or 20-in. wide, 6-in. deep troughs. For facts, call your nearby Link-Belt office or authorized stock-carrying distributor. Or write for Book 2644.

positive action frequency principles

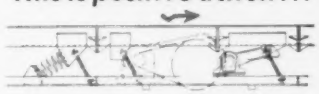


This is *natural frequency* . . .



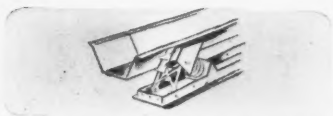
NATURAL FREQUENCY results in low power requirements, minimum stress on parts. Comparable to a spring-mounted weight which is deflected, then released. Unit will vibrate at its "natural frequency" with gradual reduction of amplitude.

This is *positive action* . . .



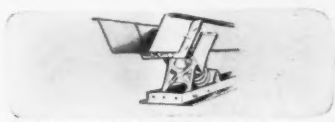
POSITIVE ACTION of the Link-Belt eccentric drive overcomes frictional resistance, maintains steady amplitude of vibration, provides constant conveying action under surge loads which might dampen other types of vibratory conveyors.

. . . and these are the features that make *Coilmount* industry's most practical conveyor for hard-to-handle materials.



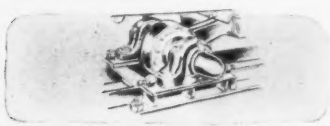
EFFICIENT, HIGH-CAPACITY CONVEYING

Deep, one-piece, self-cleaning trough permits free material flow—prevents spillage. Dividers available for conveying two or more materials simultaneously.



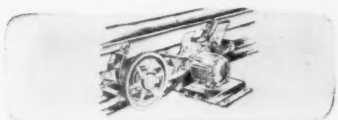
MINIMUM UNDESIRABLE MASS

Cast aluminum reactor legs minimize oscillating mass—resist heat and corrosion. Natural frequency reactor springs reduce stress. Joints do not need lubrication.



POSITIVE CONTROL OF LOAD

"Positive action" controls load. Constant-stroke eccentric drive with heavy duty roller bearings maintains conveying efficiency regardless of normal surges.



FLEXIBLE DRIVE ARRANGEMENT

Compact drive can be installed at feed end or beneath intermediate conveyor section—on left or right side to suit layout requirements.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,458

LINK-BELT

THE SYMBOL OF QUALITY · LB · LINK-BELT

OSCILLATING CONVEYORS

Circle 609 on Inquiry Card—Page 51

ANSCO INDUSTRIAL X-RAY FILMS HELP AMERICA MOLD ITS FUTURE

A new America is taking shape . . . a nation mighty in metal that's stronger, truer and more dependable than ever before. Guaranteeing this dependability is today, more than ever, a job for radiography.

More and more, when industry wants a radiographic film for precision work, it calls on Ansco Superay "B". One of the first films tailored especially for industry, Superay "B" is the highest contrast Ansco film of them all—ideal for use with all voltages. Call on Superay "B" for consistently accurate readings of heavy metal weldments and castings—wherever outstanding definition and detail are desired.

For finest results, make sure to process with Ansco chemicals: Liquadol, Liquadol Replenisher, Liquafix.

America's oldest maker of photographic materials..... Ansco

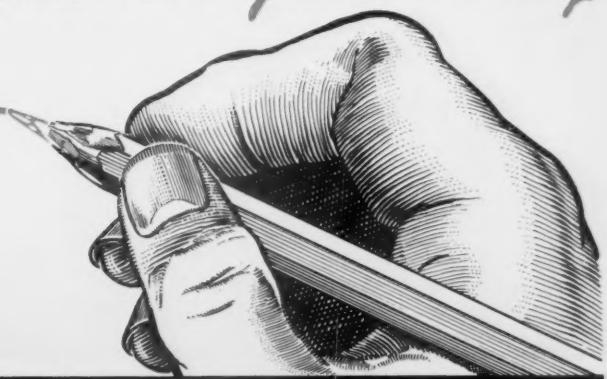
Binghamton, New York • A Division of General Aniline & Film Corporation

CEDAR HEIGHTS
AIRFLOATED CLAY

is actually refined to 200 mesh.
It is something new in the industry . . . a superior bonding clay with a vast range of applications. Lab control assures consistent quality. We also produce quality Fire Clay and Bonding Clay.

Note: Cedar Heights Airfloated Clay is available to foundrymen everywhere every day of the year

MINERS
PROCESSORS
REFINERS
PACKAGERS
SHIPPERS

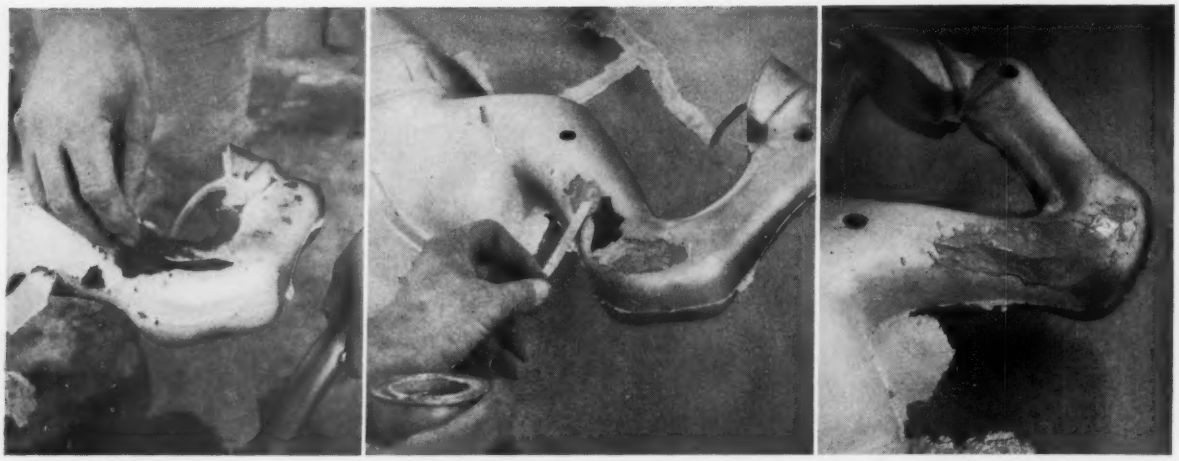


CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD OAK HILL, OHIO

Let us send you the name of your nearest distributor. You'll be glad you inquired.

P.S. Let us furnish a free sample for your examination



Holes in thin-wall castings are economically repaired with epoxy resin cements. First step is to build a supporting base for the Metalset. In this case foundry sand was forced in the hole and levelled off just below the casting's surface. After the Metalset cures, the repaired area is buffed with a portable power tool.

New Epoxy Resin Cements Are Machinable Have High Adhesion – Resist Corrosion

Nonstructural defects such as these are easily patched and machined with Smooth-On Metalset, an epoxy resin compound available with either iron or aluminum filler. Metalset can be applied in any thickness with less than one-tenth of 1% shrinkage, adheres well to iron, steel, aluminum and can be machined to a feather edge.

FREE Samples of SMOOTH-ON Foundry Cements

METALSET A2–Aluminum-filled epoxy resin
METALSET F1–Iron-filled epoxy resin
SMOOTH-ON No. 4AA–Cement for light gray castings
SMOOTH-ON No. 4A–Iron cement for medium gray castings
SMOOTH-ON No. 4B–Iron cement for dark gray castings
SMOOTH-ON No. 8–Similar to iron cements but with color of aluminum.

Properties of Smooth-On's foundry cements, in use since 1895, are well known. The new Metalset cements are recommended where adhesion, machinability, or water resistance are stressed.

SMOOTH-ON MANUFACTURING COMPANY, 572 Communipaw Ave., Jersey City 4, N. J. SO 424

BY POPULAR DEMAND!

fine FANNER King Size

SCAB NAILS

with these "wanted" features

Cover FOUR TIMES the area, of conventional large head foundry nails

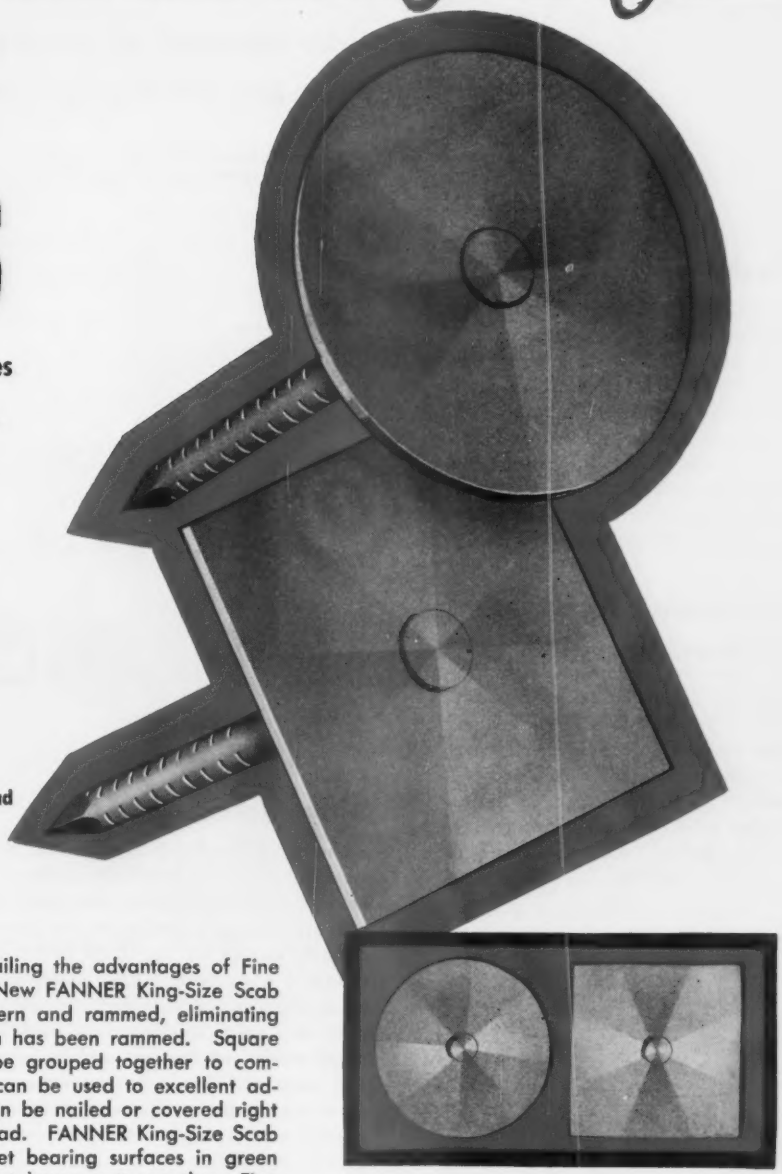
Requires 1/4 of labor-setting time

Lighter weight — more pieces per pound

Provides greater sand retention

Produce better castings

Available in 1" round or square head
Sizes: 7/8" to 2 1/2" long
Coppered or Tinned



Foundrymen everywhere are hailing the advantages of Fine FANNER King-Size Scab Nails. New FANNER King-Size Scab Nails can be placed on the pattern and rammed, eliminating hand setting of nails after pattern has been rammed. Square head King-Size Scab Nails can be grouped together to completely cover a given area . . . can be used to excellent advantage at gate areas. Molds can be nailed or covered right into the corner with the squore head. FANNER King-Size Scab Nails can also be used as chaplet bearing surfaces in green sand molds. For better castings at lower cost, use these Fine FANNER King-Size Scab Nails—write for samples and prices today!

*Fine **FANNER** King-Size Scab Nails shown here are actual size*

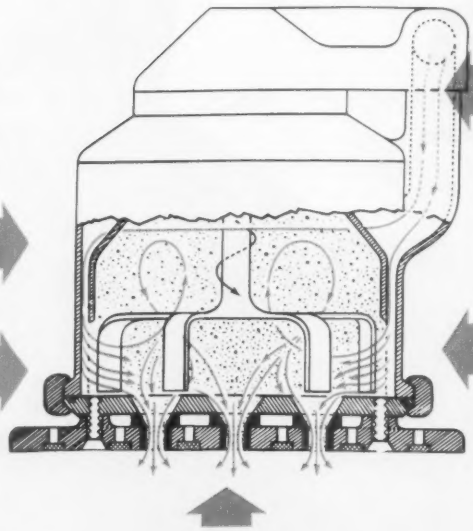
THE FANNER MANUFACTURING CO.
Brookside Park **Cleveland 9, Ohio**

Circle 613 on Inquiry Card—Page 51

Next Page Circle 614→

No other core making machine

"Cyclo-air" action utilizes air to its fullest capabilities, so it can perform all three basic functions—(1) enveloping sand grains to "lubricate" the sand, (2) transporting sand through blow holes into core box (3) ramming sand to proper hardness.



"Cut-away" drawing of the "40" model blow head, showing agitator and aerating air circuit.

"Cyclo-air" Air Circuit

Arrows show how air enters sand mass from all sides of blow head. Thousands of tiny air streams aerate and fluff-up sand – enveloping each grain with air to *neutralize the natural cohesion* between sand grains. Sand *must* be "lubricated" for flowability and proper ramming. "Sudden-ejection" methods get sand into the box, but do not provide for proper ramming.

"Cyclo-air" Agitator

Motor-driven plows, revolving during the blow cycle, combine with SAN-BLO'S air circuit to aerate sand and move it to the blow holes, keeping them covered with sand at all times, to eliminate "piping". This makes it possible for the SAN-BLO to deliver 80% or more of its sand capacity into the core box and blow small cores or large cores from the same blow head.

Air Supply

The "40" SAN-BLO model uses a 2" air supply line and blow valve, to provide adequate air volume and pressure for proper mixing, transporting and ramming of the sand. SAN-BLO uses air efficiently, therefore economically – does not require a built-in air tank to store up air.

Standard Blow Head

SAN-BLO core blowers are equipped with a standard blow head that *never* has to be changed – yet all cores, small and large, are blown with equal efficiency. The "40" model will blow cores weighing from a few ounces each, up to 40 lbs. each, from the same blow head. No extra blow or shoot heads to buy – no time lost changing them!

Blow Holes

Because the SAN-BLO'S agitator and aerating air circuit keep all blow holes covered with sand during the blow cycle, to prevent "piping", blow holes can be accurately located for any shape box to be blown – even boxes with undercuts or other complex shapes – with full assurance that sand will penetrate and fill every section of the box and be properly rammed. There's no restriction on core box shape, as there is with machines employing a "straight-down, shooting action".

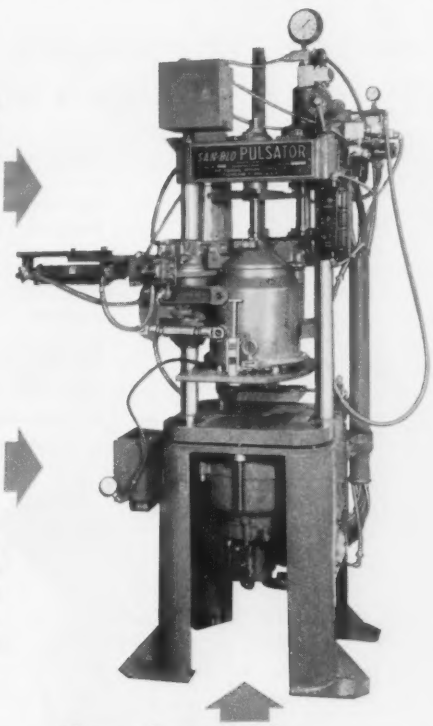
Manufactured by

San-Blo Division

can match SAN-BLO's® "cyclo-air" action!

"Cyclo-air" action, plus other SAN-BLO features permits the blowing of all practical core sand mixtures (CO_2, oil, resin, dry compound, green sand), in wooden or metal core boxes— safely, with minimum core box wear and with equal efficiency.

"40" model SAN-BLO, fully equipped with "LPP", "Pulsator" and "Quick-Change Assembly".



Low Pressure Prefill

A timer and air valve arrangement by means of which *low air pressure* is used to "riddle" sand into the core box and *full line pressure* automatically cut in for ramming the core. Eliminates sand blasting effect, so that core box wear is held to a minimum.

Automatic Controls

Single-push-button control for automatic clamping, blowing and drawing operations. Assures a much faster production rate than possible with manually-operated machines.

Pulsator Type Blow

For blowing wooden core boxes safely. An air valve and control arrangement converts machine from continuous blow to a series of short blows, preventing excessive pressure build-up within the core box.

Quick-Change Assembly

For open-top boxes, a "quick-change, universal blow and vent plate assembly" provides for making up inexpensive blow sheets quickly, and changing them on the machine in a matter of seconds. No need for extra blow heads or shoot heads, no need to remove sand — just to change core boxes.

Clamping Table

Air-oil controlled clamp-draw table, with 6" stroke, provides more-than-adequate clamping pressure for "blow-proof" vertical clamping of all core boxes. By fastening cope half of core box to the blow plate, cores can be drawn.

We'd appreciate an opportunity to tell you more about the SAN-BLO *— the modern, versatile core blower. Write for full information or ask our sales engineer to call.*

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The **FEDERAL FOUNDRY SUPPLY** *Company* 4600 EAST 71st STREET · CLEVELAND 5, OHIO

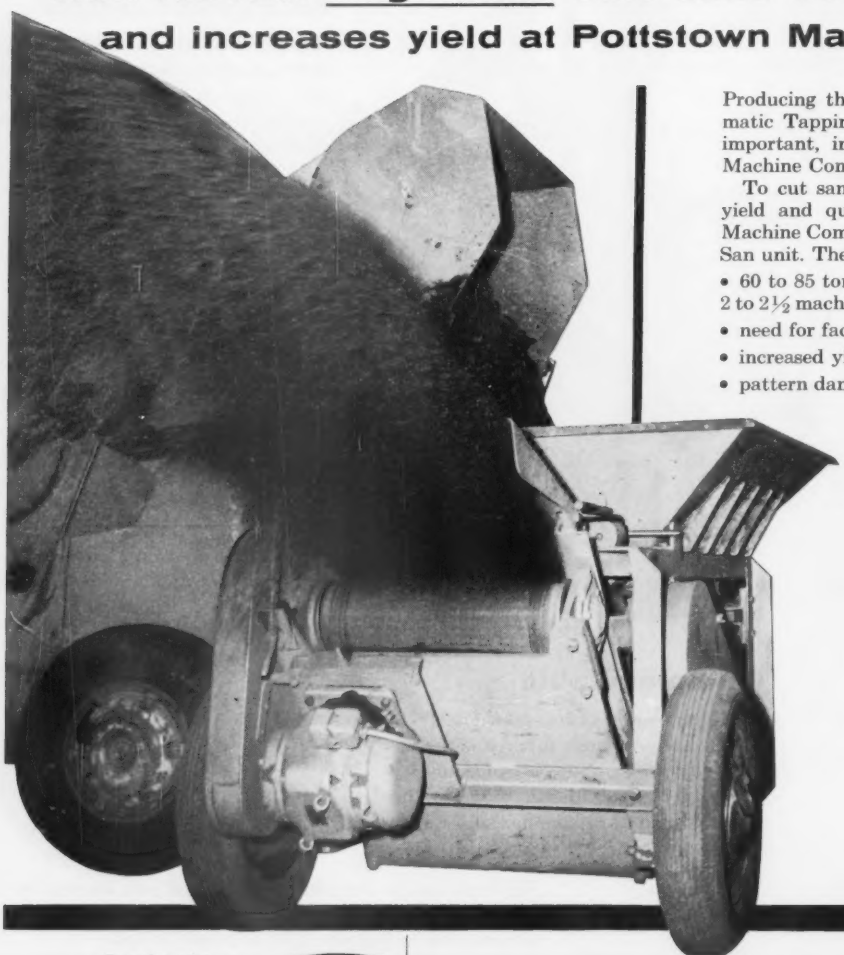
(Upper) Compact—Highly Portable . . . 60" x 90" size fits it into any layout . . . turns on 6½ foot radius . . . handy yoke hitch for crane moving.
(Lower) At Pottstown, Magna-San flanks each molding station with 20-foot windrow of cooled, perfectly conditioned sand.

15 cu. ft. hopper can be fed from three sides, as fast as a front end loader can be positioned. Note hopper grate to "hold up" large sprues, spills, etc.

Handling a very heavy sand at Pottstown, note fluffy, clean, thoroughly-aerated discharge. Rugged construction is typical of Royer.

End Result—a high-quality precision tool—Pottstown's internationally-known Automatic Tapping and Threading Machines for pipe fittings, valves, etc.

How ROYER Magna-San cuts sand conditioning costs and increases yield at Pottstown Machine Company



Producing the castings for their famous Automatic Tapping and Threading Machines is an important, integrated operation at Pottstown Machine Company.

To cut sand conditioning costs and increase yield and quality of castings, the Pottstown Machine Company chose the *new* Royer Magna-San unit. Their experience:

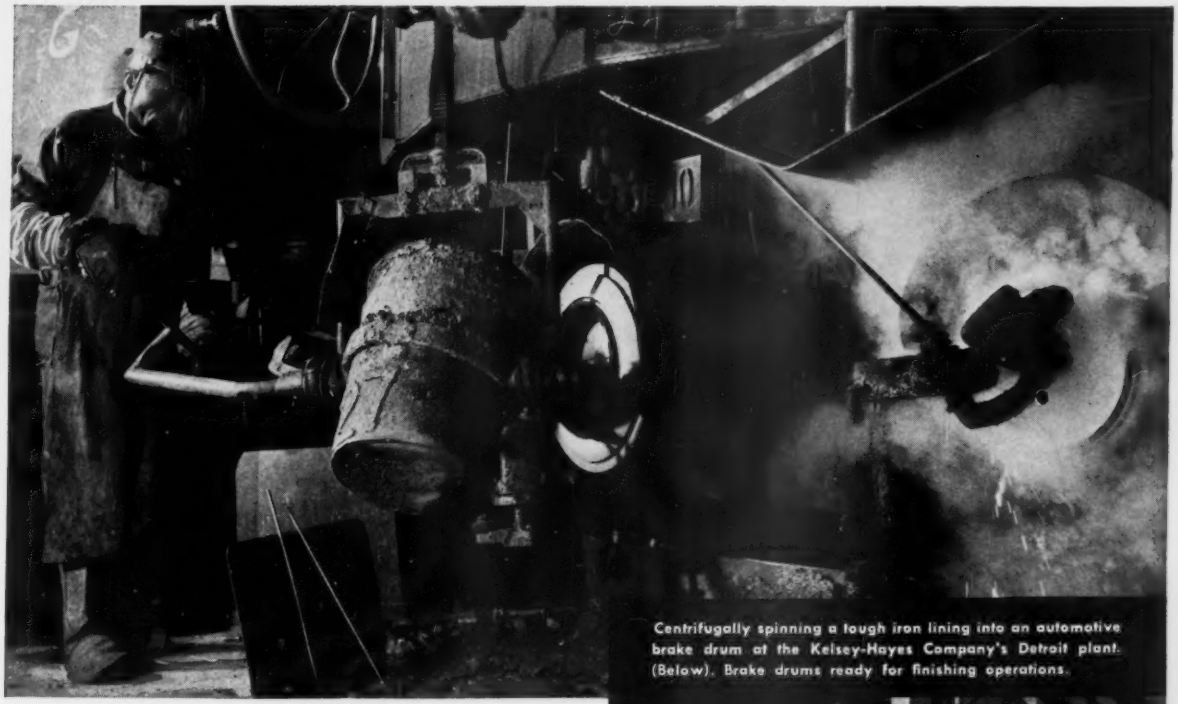
- 60 to 85 tons of sand perfectly conditioned in 2 to 2½ machine hours . . . only 4 to 5 man hours
- need for facing sand cut more than 50%
- increased yield of finest quality castings
- pattern damage cut to rock bottom
- a *new method* that makes entire foundry operation more clean-cut and straightforward

Magna-San magnetically cleans, mixes, blends and aerates up to 45 tons of sand per hour—at a lower initial cost and much less upkeep than any other mechanical method. Investigate this valuable addition to the facilities of *your* foundry—be it large or small. Write for detailed literature and the name of the service-minded Royer agent in your area.

Foundry-wise agents throughout the U.S. and Canada
EXPORT DEPT.
10406 South Western Ave.
Chicago 43, Ill.

ROYER

ROYER FOUNDRY & MACHINE CO.
159 PRINGLE STREET / KINGSTON, PENNA.
FOREMOST IN SAND CONDITIONING EQUIPMENT



Centrifugally spinning a tough iron lining into an automotive brake drum at the Kelsey-Hayes Company's Detroit plant. (Below). Brake drums ready for finishing operations.

Kelsey-Hayes casts longer wearing brake drums with Hanna pig iron

Kelsey-Hayes is a key supplier to the auto industry. One of its leading products is a brake drum with a centrifugally spun iron lining. Kelsey-Hayes also produces thousands of sand cast brake drums. Strict uniformity of each melt is of major importance to Kelsey-Hayes.

To maintain their high standards, Kelsey-Hayes uses thousands of tons of Hanna Malleable Pig Iron annually.

Kelsey-Hayes, like the many other Hanna customers, knows that for pig iron of high metallurgical quality and analysis, it can always depend on Hanna.

Hanna makes all regular grades of pig iron, as well as HannaTite and Hanna Silvery, available in two sizes—the 38-pound pig and the 10-pound HannaTen ingot. Hanna qualities contribute to the production of denser, stronger castings with uniform machining qualities. These features are particularly beneficial in HannaTite—a specially made iron, possessing extra-fine grain structure with smaller, uniformly distributed graphite flakes.

HANNA
THE FIRST KNOWN NAME IN IRON

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

ANDREX **announcement**

Picker x-ray

Picker X-Ray Corporation and Holger Andreasen, Inc. are pleased to announce that, effective April 1, 1957, all Andrex equipment for industrial radiography will be distributed and serviced in the United States exclusively by Picker X-Ray Corporation.

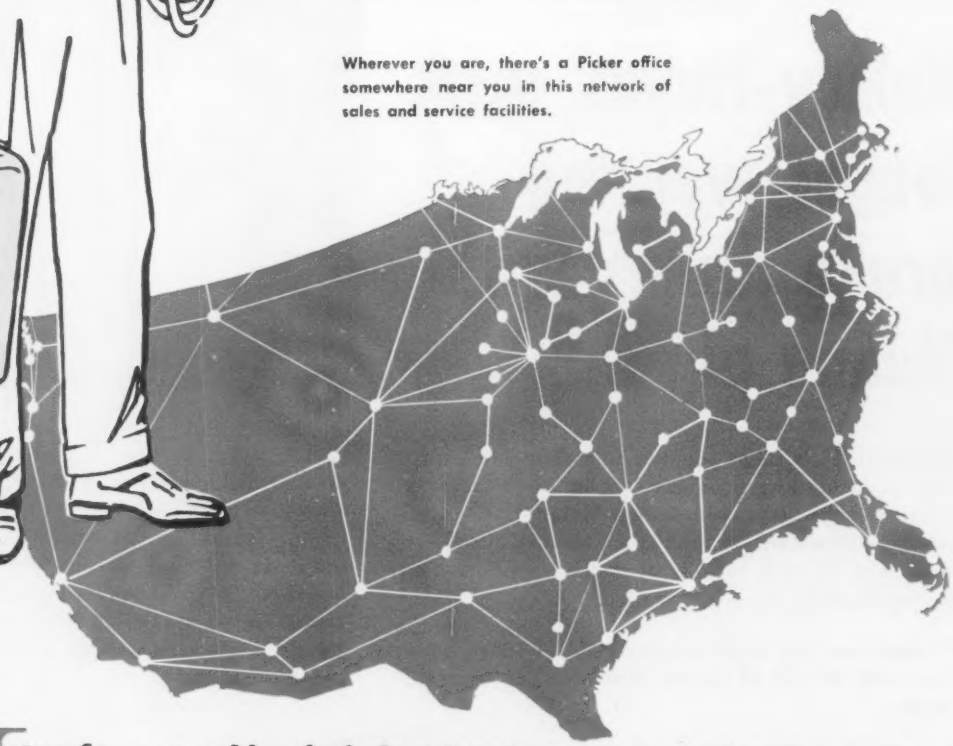
The new arrangement will enable present and prospective users of Andrex equipment to share, jointly with users of Picker apparatus, the sales and technical facilities of the nationwide Picker engineering and service organization.

Inquiries may be directed to any local Picker office.

Or write to Picker X-Ray Corporation,

25 South Broadway, White Plains, N. Y.

Wherever you are, there's a Picker office somewhere near you in this network of sales and service facilities.



PICKER... one stop for everything in industrial fluoroscopy and radiography

ANDREX lightweight portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV and *Andrescope* X-ray Stress Analyzer.

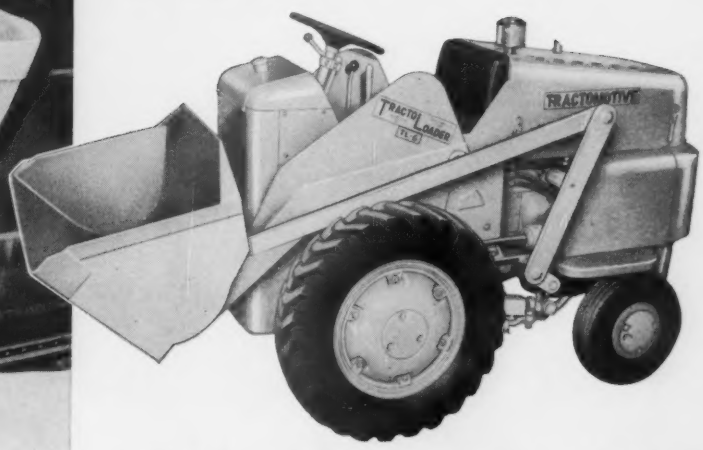
PICKER x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty, x-ray diffraction apparatus, rayproof inspection cabinets.

ACCESSORIES . . . films, tanks, darkroom sundries, illuminators, *everything.*

TECHNICAL OPERATIONS units for isotope radiography—sources, equipment, containers for Iridium 192 Cesium 137 Cobalt 60 and Thulium 170.

Circle 617 on Inquiry Card—Page 51

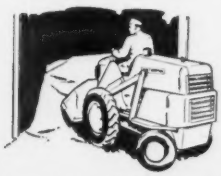
BUCKET CAPACITY: ½ cu yd
BRAKE HP: 33.7
SPEEDS: 2 forward; up to 10 mph
2 reverse; up to 20 mph
WEIGHT: 6,100 lb



TRY THIS FOR SIZE IN TIGHT QUARTERS

Compact TRACTOMOTIVE TL-6 TRACTO LOADER is a high producer in confined areas

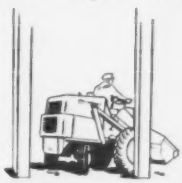
Quickly unloads boxcars Users report it takes only two to three hours to completely unload a boxcar of bulk materials by using the TL-6 and a conveyor setup. Loading goes fast because there's a scooping action with tip-back bucket — and no ramming to get load. You ease bucket into pile and the hydraulic torque converter drive crowds in a heaping load — action is smooth, positive. No gear shifting either — operator just pulls or pushes a lever to go forward or reverse.



Travels through narrow aisles and doorways Compact design makes it easy to move material from one place to another in your plant . . . or to bring in material from outside stockpiles. Over-all length is only 9 ft, 7 in; width 4 ft, 5 in; height 5 ft, 4 in.

And loads are carried low, in a level position, with 50-degree tip-back of bucket — means less spillage, greater stability, better visibility and easier maneuvering.

Makes hairpin turns around columns and posts TL-6 keeps travel time down because it makes right-angle turns around columns and posts. No lost time maneuvering around, either — there is a short, 6½-ft turning radius. And the operator's job is made easier with Power Steering — now standard equipment!



Ask your Allis-Chalmers construction machinery dealer to show you how you can save time and money on close-quarter material handling with the TL-6 Tracto-Loader. See for yourself why

TRACTO is a sure sign of modern design

SOLD AND SERVICED BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER

Send For Free Descriptive Catalog On The Complete Line Of Tracto-Loaders ▶

TRACTOMOTIVE

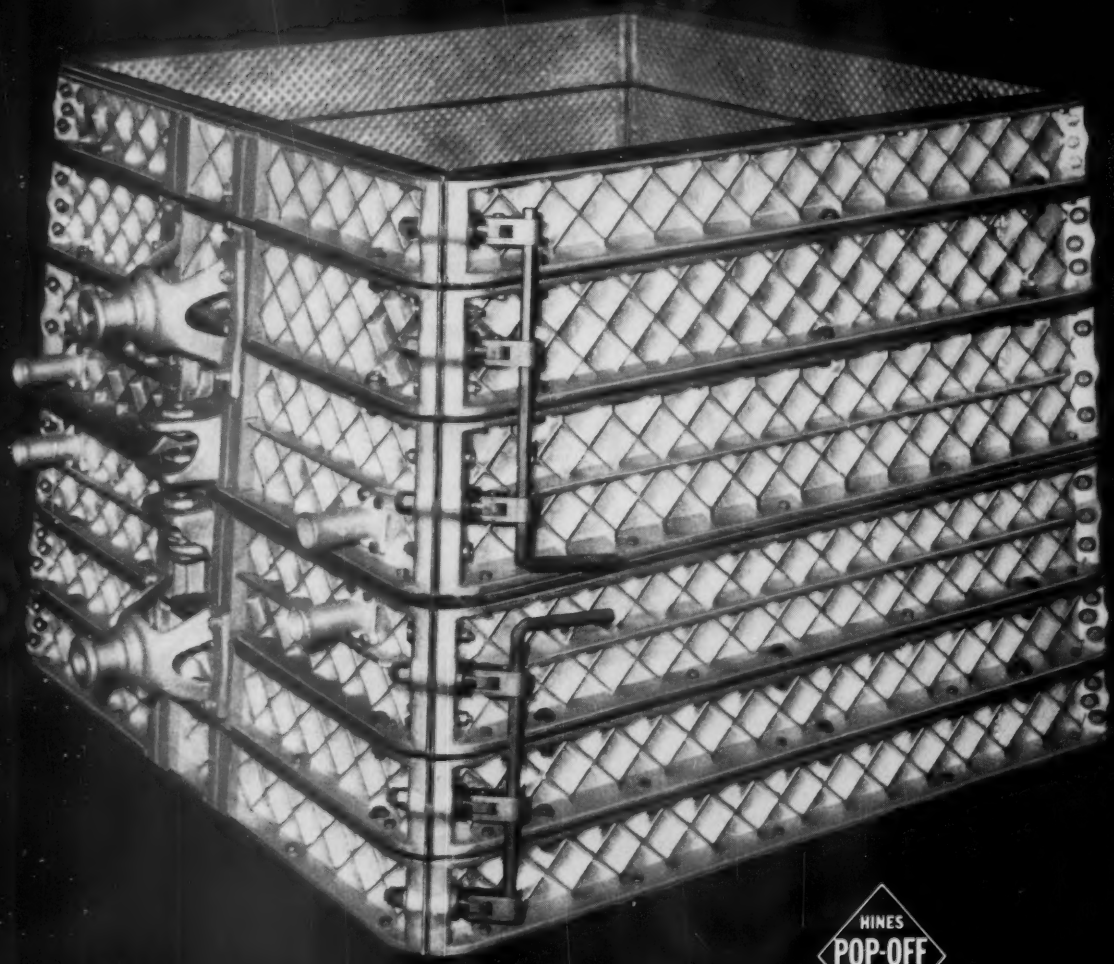
TRACTOMOTIVE CORPORATION • DEERFIELD, ILLINOIS

TRACTOMOTIVE CORPORATION, Dept. F
Deerfield, Illinois

☐ Please arrange a demonstration of the TL-6
☐ Send catalog on Tracto-Loaders

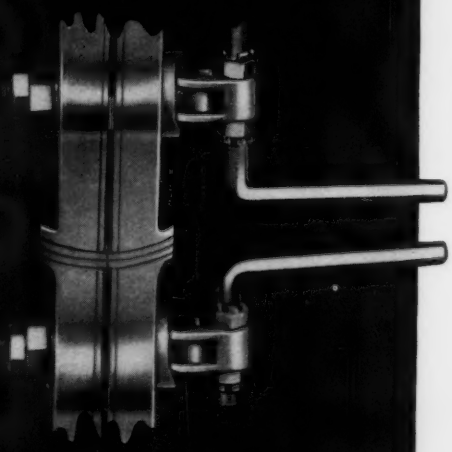
Name .....
Title .....
Company .....
Address .....
City ..... State .....

Circle 618 on Inquiry Card—Page 51



HINES
POP-OFF
FLASK
FEMA

Heavy duty HINES "POP-OFF" flask, 36" x 36" x 34" high, 7" cope, plus 5" upset, plus 4" upset, 6" drag, plus two 4" upsets. Equipped with trunnions and handles.

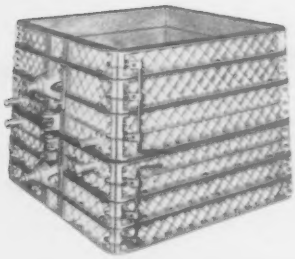


LOCKED POSITION

UNLOCKED POSITION

PATENTS PENDING

NEW HINES FLASK CUTS 12 OPERATIONS DOWN TO ONLY 2 !



This heavy-duty HINES flask, equipped with the new "POP-OFF" locking mechanism, really cuts down on flask removal time! If fitted with old-style individual levers for each section, six operations would be required to open each corner—twelve operations in all. Now, to open each corner, it's only necessary to grasp the two handles together, turn them 45° and all six sections are unlocked simultaneously! Only two operations to open the entire flask, quickly and smoothly.

This exclusive locking mechanism is available on all HINES "POP-OFF" flasks, to speed up the opening of any required number of flask sections. It eliminates strain usually exerted on flask and pins when each section is opened separately. Adjustment is easier, too, as nuts and lock nuts merely need to be taken up, to compensate for wear. Replacement of parts, if ever necessary, is a very simple matter.

Next time you're ready to buy flasks, be sure to consider these new, faster-acting HINES "POP-OFF" flasks — for better molds and better castings.

THE HINES FLASK CO.

3431 WEST 140TH STREET · CLEVELAND 11, OHIO

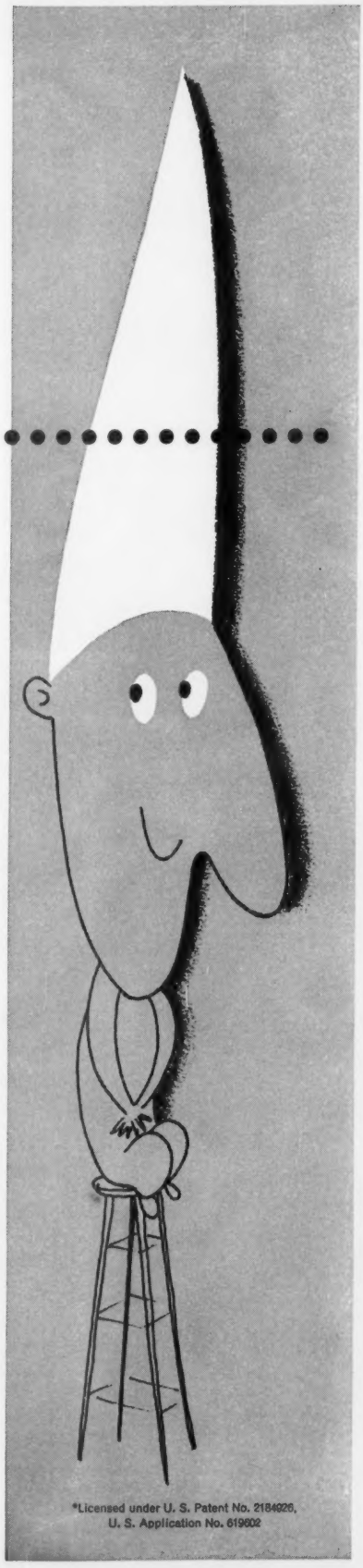
Circle 619 on Inquiry Card—Page 51

It is obvious, of course, that we couldn't ask for, and get, $20 or $30 more per ton of shot and grit unless we could deliver substantial savings to the user every time! It is also obvious that we couldn't offer a guaranteed amount of savings (in writing) and in cash, starting with a premium price, unless we really had something! We have.

We weren't born yesterday!.....

Permabrasive is the only pearlitic malleable shot and grit—made with the proper analysis and a controlled heat treatment. Pearlitic malleable shot and grit is less susceptible to breakdown, has greater resistance to impact and has better cleaning action. It is so much easier on your equipment!

And it doesn't take a complicated routine-upsetting test to prove our point. We'll install a simple ($15) GE time meter on your cleaning equipment and an office boy can keep the records. Would a 10% annual saving on just abrasive costs alone interest you? We'll guarantee *this* much in writing! Further savings on maintenance will astound you. And your time meter keeps records of all this without fuss or feathers. Can you afford NOT to use Permabrasive?



*Licensed under U. S. Patent No. 2184926, U. S. Application No. 619602

A BONUS IN TRIPLETS!

Permabrasive is available (at no extra cost) in 50 lb. clinch-locked, corrugated cartons, palletized on an expendable pallet, 40 cartons to a package. Here is a triple value: safe to handle, easy to handle and the best shot and grit there is! You have a safe, one-man load; easy to keep track of stock, take inventory; stacks neatly and firmly; unloads in minutes instead of hours. Write for free folder: "It's Triplets"

PERMABRASIVE* PEARLITIC MALLEABLE SHOT AND GRIT IS PRODUCED EXCLUSIVELY BY

NATIONAL METAL ABRASIVE COMPANY

3569 NORTON RD. • CLEVELAND 11, OHIO

SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & COMPANY

(INCORPORATED)

CHICAGO, DETROIT, CINCINNATI, ST. LOUIS, NEW YORK, CLEVELAND, PHILADELPHIA, PITTSBURGH, INDIANAPOLIS

Coming in May

A timely editorial report to foundrymen . . . .

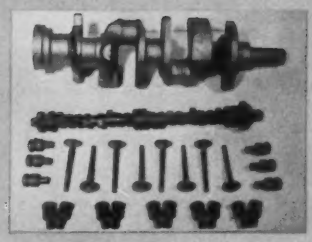
FOUNDRIES CAN SELL MORE CASTINGS

an "IDEA" article in five special sections

The editors of FOUNDRY announce plans for presentation of a thorough discussion of ways and means of selling more castings —a special editorial report being prepared for this year's May Pre-Convention issue. Attention will be given to foundry sales problems in five major areas.

1 MARKET POTENTIALS FOR CASTINGS

In which the editors will discuss and illustrate the long-term trends in market potentials for castings. More particularly they will point to areas where present opportunities occur.



2 HOW NEW TECHNICAL DEVELOPMENTS CAN BE USED TO BOOST CASTING SALES

A study of many new processes, materials and controls presently available for expanding the use and sale of castings.

3 HOW RESEARCH AND PRODUCT DEVELOPMENT CAN SELL CASTINGS

This feature will dramatize and explain ways in which foundrymen can recapture business lost to other fabricating methods and create new applications for castings through conversions.

4 HOW ONE FOUNDRY USED NEW METHODS TO INCREASE SALES

This will be an interesting case study of the manner in which one progressive foundry boosted sales through the aggressive use of new casting developments now available.

5 HOW TO BUILD A MARKETING PROGRAM

This will be a practical approach to the problem of gearing up for selling on a planned basis. It will have values for use by small, medium and large sized foundries.

Look for this special report in the FOUNDRY

MAY 1957 PRE-CONVENTION ISSUE

AFS CASTINGS CONGRESS
and 1st Engineered Castings Show
Cincinnati—May 6 to 10, 1957

61st CASTINGS CONGRESS

and

1st Engineered Castings Show

AMERICAN FOUNDRYMEN'S SOCIETY

Cincinnati, Ohio
May 6 to 10, 1957

FOUNDRY

MAY 1957 PRE-CONVENTION ISSUE

The May Pre-Convention issue of FOUNDRY will be mailed one week earlier than usual to reach foundrymen well in advance of the convention.

FOUNDRIES CAN SELL MORE CASTINGS

A Special Editorial "assist" in five helpful sections.

AFS CASTING CONGRESS

A description of the Technical Program, convention activities and planning for this year's AFS meeting.

FEATURE STORIES AND REGULAR DEPARTMENTS

Regularly scheduled features, Late News, Questions and Answers and other departments will appear as usual.

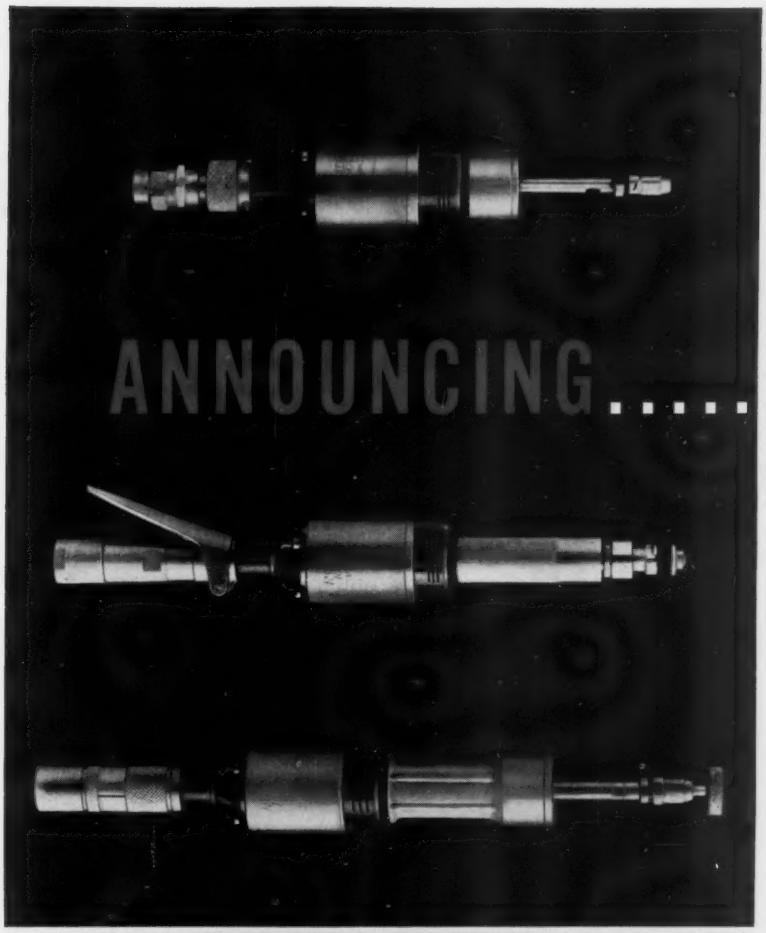
And in June

POST CONVENTION ISSUE . . . .

The news and picture story of the Cincinnati convention and technical sessions will be a special feature of the June Post-Convention issue of FOUNDRY.

FOUNDRY

A PENTON PUBLICATION · PENTON BUILDING · CLEVELAND 13, O.



NEW ROTOR "117" series Small-Wheel Air Grinders

Check these features:

Governed for top production. Runs at best practical working speed for *maximum power.* Available in 17,000, 12,000 or 8,000 rpm.

Quiet. Designed for quiet operation.

Wide selection. You can select from over 150 different combinations of speeds, spindles and throttles to do *your* job.

Ask the Rotor Application Engineer for a demonstration on your job. Bulletin 59 free on request. The ROTOR TOOL Company, Cleveland 32, Ohio.

Here's the RIGHT TOOL for YOUR job!

Rotor Air Tools: Assembly Tools • Drills • Small Wheel Grinders
Straight Grinders • Vertical Grinders • Scalers • Chippers • Rammers
Rotor High-Cycle Electric Tools: Grinders • Polishers • Sanders

ROTOR TOOLS®
CLEVELAND, OHIO

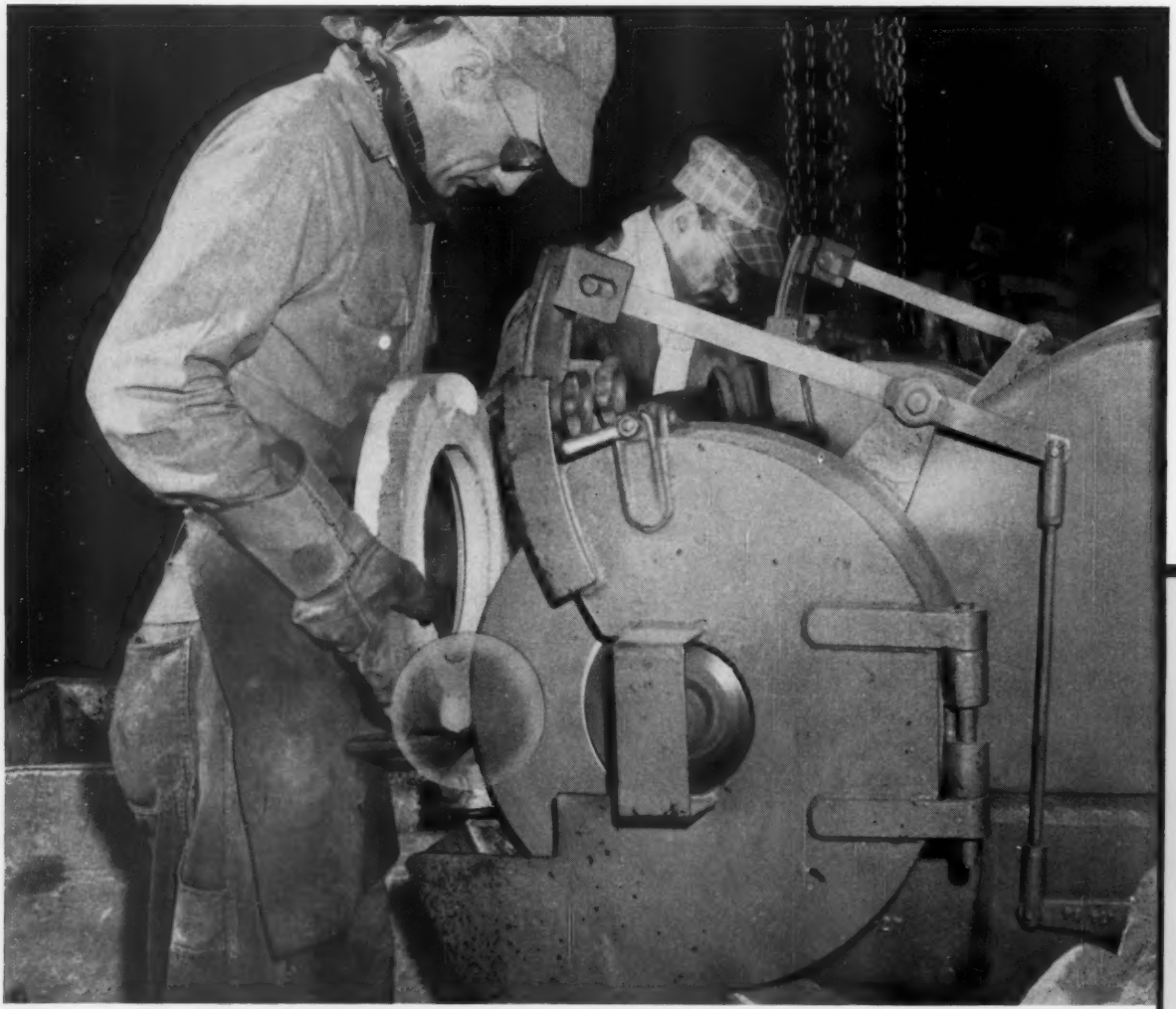
Circle 621 on Inquiry Card—Page 51

3 hard-working wheels

CRYSTOLON K bond, ALUNDUM* B-11 bond and BN reinforced wheels bring the "TOUCH of GOLD" that adds product value and cuts grinding costs*

The most reliable way you can gauge any grinding wheel's value is by its *grinding quality* — the factor which takes into consideration *both* wheel cost and labor cost.

Continuous research and testing by Norton, together with many job-reports from non-ferrous foundries, prove that for three important types



A CRYSTOLON K BOND VITRIFIED WHEEL combines the abrasive and bond that make grinding this bronze casting easier, more economical. There's no better wheel for grinding brass and bronze on any type of machine.

for soft-metal grinding

of soft-metal grinding, these three types of Norton wheels with exactly the right grinding quality provide best performance at lowest cost.

FOR GRINDING BRONZE AND BRASS, Norton CRYSTOLON K bond vitrified wheels wear at just the right rate to assure the grinding quality that means more grinding for less money.

FOR GRINDING ALUMINUM, Norton ALUNDUM B-11 resinoid wheels offer the abrasive-and-bond combination that means fastest, coolest cutting action with longest wheel life.

FOR CUTTING-OFF AND NOTCHING gates and risers, Norton BN reinforced resinoid wheels combine unusually high resistance to breakage with fast cutting action and long wheel life.

Your Norton Distributor

will be glad to help you select wheels that will add the cost-cutting, product-improving "Touch of Gold" to every grinding job, on every material and every type of grinder in your cleaning room. Ask your Norton Distributor for the booklet *Rough Grinding.* Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

W-1780

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

AN ALUNDUM B-11 RESINOID WHEEL, rough grinding aluminum castings, has the fast cutting action and long wheel life that add up to ideal grinding quality for applications on this metal.

A BN REINFORCED RESINOID WHEEL is not only useful for cutting-off and notching gates and risers but for light snagging and many other jobs. It's one of industry's safest, longest-lasting cut-off wheels.

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes

Circle 622 on Inquiry Card—Page 51

9 ways better at watching over you

Picker Gardray Radiation Badges

1 wide intensity range
Records exposures low as 50 mr, high as 300,000 mr.

2 wide energy range
Gamma, beta, x-rays (soft and hard) neutrons, single or mixed exposures.

3 "control" safeguard
Separate control badge guards against accidental fogging.

4 double-sure identification
1 code printed on wrapper
2 x-rayed on film

5 no loading or unloading
Wear badge as received, return it intact.

6 prompt reporting
Dependable, easy-to-read, too.

7 compact, lightweight
See size above: less than 1 oz.

8 attractive, unobtrusive
Clips on firmly, won't catch clothing.

9 durable
Secure snap-locks, won't come undone, won't break.

To subscribe, call any Picker X-Ray local office (see your 'phone book) or write to Picker X-Ray Corporation, 25 So. Broadway, White Plains, N. Y.

Circle 623 on Inquiry Card—Page 51

Readers' Comment

Price Decline No Factor

TO THE EDITORS:

Your editorial in the March issue covers the scrap export situation in fine style.

Having read the study reports prepared by the Department of Commerce and Battelle Memorial Institute, it would seem clear that some restriction—both qualitative and quantitative—should be put into effect by the Department of Commerce.

I would have some fear that government officials—either in the Department or in the Congress—might suppose that the foundries are less concerned about this export situation since the price of scrap has recently declined. We have always maintained that the price level has nothing whatever to do with the question of our country's ability to ship five or six million tons of scrap overseas. The question is—and always has been—can we, in the light of the national interest, spare that much scrap? Our contention that the answer is "no" seems to be fully supported by the conclusions drawn by the Department of Commerce.

I sincerely hope that officials in Washington will not be misled into thinking that our interest in this question has been altered in the slightest as a result of the decline in the price of scrap.

LOWELL D. RYAN
Executive Vice President

Malleable Founders' Society
Union Commerce Building
Cleveland 14

* * *

Atomic Energy and Castings

TO THE EDITORS:

May I congratulate you on your four-page display in your current issue on the subject "Foundries Can Sell More Castings."

It just struck me as the kind of waker-upper the industry needs.

As chairman of the East Coast Regional Foundry Conference to be held in Philadelphia, April 12-13, I am trying to point out what I believe may develop into an important new market for the foundry industry in the atomic energy program. Maybe it isn't there but certainly it seems to me high time the foundry industry either found out what may be available in the way of a new market for castings or found out there is nothing there for the industry.

I am impressed by a recent report to the effect that no less than 59 power reactors are now under construction in this country. They are being constructed of metal, thousands of tons of it. How may tons of castings?

When we consider that every major university is conducting research in the subject at the graduate level and instruction at the undergraduate, that many public utilities are planning or actually constructing power reactors, that General Electric, Westinghouse and Allis-Chalmers are active in this field, I think we must concede that we are no longer at the threshold of an atomic age but are well inside the door.

At the conference we are scheduling two speakers on the subject—Dr. Simmons, chief, metallurgical section, AEC, and Dr. Pennington, professor of metallurgy, University of Maryland.

While I am writing you, I want to tell you how much I enjoyed the recent piece about the editor's dad. It was not only a heart warming story in itself but I think recalled to many of us memories of our own dads.

My own dad came to Cleveland during World War I and converted an old car barn into a malleable foundry for Grabler. He remained with Grabler as superintendent of that plant until he passed away in 1920.

WALTER S. GIELE

Walter Giele Co.
P.O. Box 483
Lebanon, Pa.

* * *

Use of Yellow Phosphorus

TO THE EDITORS:

In the "Question and Answer" section of the December 1956 issue, reference is made to adding phosphorus to copper.

Rather than recommend the use of red phosphorus for production of 15 per cent phosphor-copper, I would suggest the use of yellow phosphorus instead. True, this latter material does have to be kept under water, but it can be conveniently done in a nearby tank and then simply wrapped in wet newspapers (at least two sheets thick) for plunging into molten oxidized copper. Yellow phosphorus is cheaper and

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Write for Bulletin 46-A

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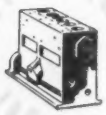

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Circle 625 on Inquiry Card—Page 51

more dense, and if copper is oxidized by the melting flame or by use of an oxidizing flux such as potassium nitrate, then little or no poisonous phosphorus fumes are evolved.

Most important is the fact that 15 per cent phosphor-copper should contain not more than 14.9 per cent phosphorus. Otherwise, the compound formed is not stable and will decompose by turning a deep blue and combine with moisture even in securely packed containers.

RICHARD H. HAUPT
Metallurgist

Hunter Engineering Co.
1495 *Columbia Ave.*
Riverside, Calif.

* * *

Back in the Early Days

TO THE EDITORS:

Your act in sending me a copy of the current issue of FOUNDRY was gratefully appreciated and likewise highly valued for its editorial worth.

As I made my way through the 275 pages, my mind went back to a day around the turn of the century to a lean but robust fledgeling THE FOUNDRY, parented by one Walter Gardner and John Penton while under the editorial nursing of Henry M. Lane.

The place of rearing was a second-story loft on what is now East Ninth Street south of Prospect Avenue.

During my years, 1900-1910, with the Wellman Engineering Co. of Cleveland, I contributed quite regularly to its columns and thereafter intermittently until February, 1945.

Many of the earlier articles were incorporated in the book *American Pattern Shop Practice,* published in 1908.

While the introduction of new materials and superior equipment over the years has changed greatly the foundry industry, it has not materially lessened the effectiveness of the wood feature of the art.

HERBERT J. MCCASLIN

40 *Gifford Ave.*
Jersey City 4, *N. J.*

* * *

Approval from Japan

TO THE EDITORS:

We are pleased to have an opportunity to advise you that we are regular readers of your FOUNDRY and also that it is always packed with comprehensive articles and very interesting and instructive.

S. OKAZAKI
President

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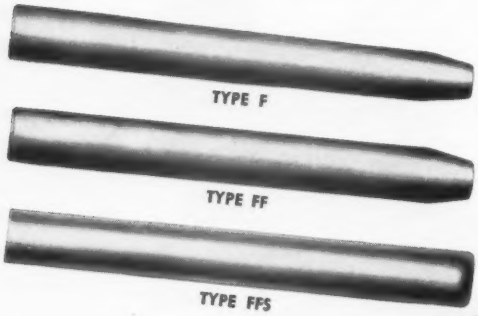

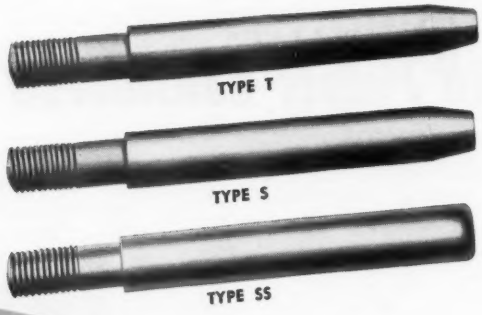

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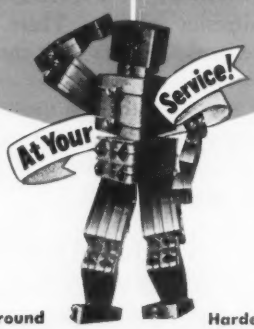
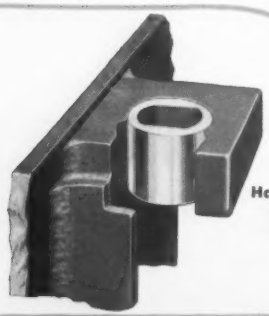
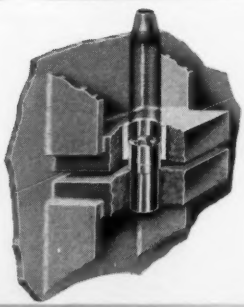




Hardened and Ground Steel Bushing as Installed in Flask.



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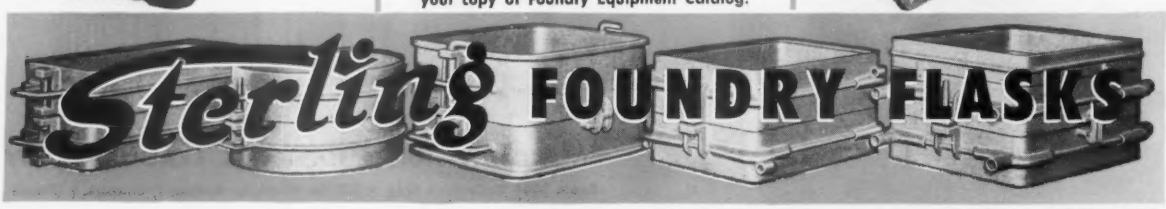

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Now Is the Time!

What will be the manpower problems of the foundry industry by 1965? Will foundries be able to secure sufficient workers to meet the castings demands of an expanding economy? Some answers to these questions are found in a recently published report of the U. S. Department of Labor entitled "Our Manpower Future 1955-1965."

During 1956, the total value of all goods and services, known as the gross national product, averaged $412 billion. By 1965, it is expected, the GNP will reach $560 billion. To provide this tremendous volume of goods and services and to satisfy the needs of the armed forces (based on 1956 levels) will require approximately 79 million workers, an increase of 10 million over the present figure. The Department of Labor believes that the labor supply in 1965 will be adequate, at least numerically—but the cushion surely will be small.

The makeup of the 10 million additional workers required by 1965 provides the real problem for the foundry industry. At present 7 out of 10 workers are men. The additional 10 million which will be required by 1965 will be made up of 5 million men and 5 million women.

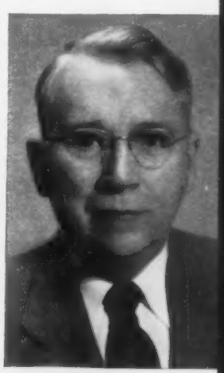
Since it is doubtful whether foundries can employ a greater percentage of women workers, other means probably will be needed to meet production demands by 1965. This situation indicates the continued expansion of mechanization and to some extent automation in the foundry industry.

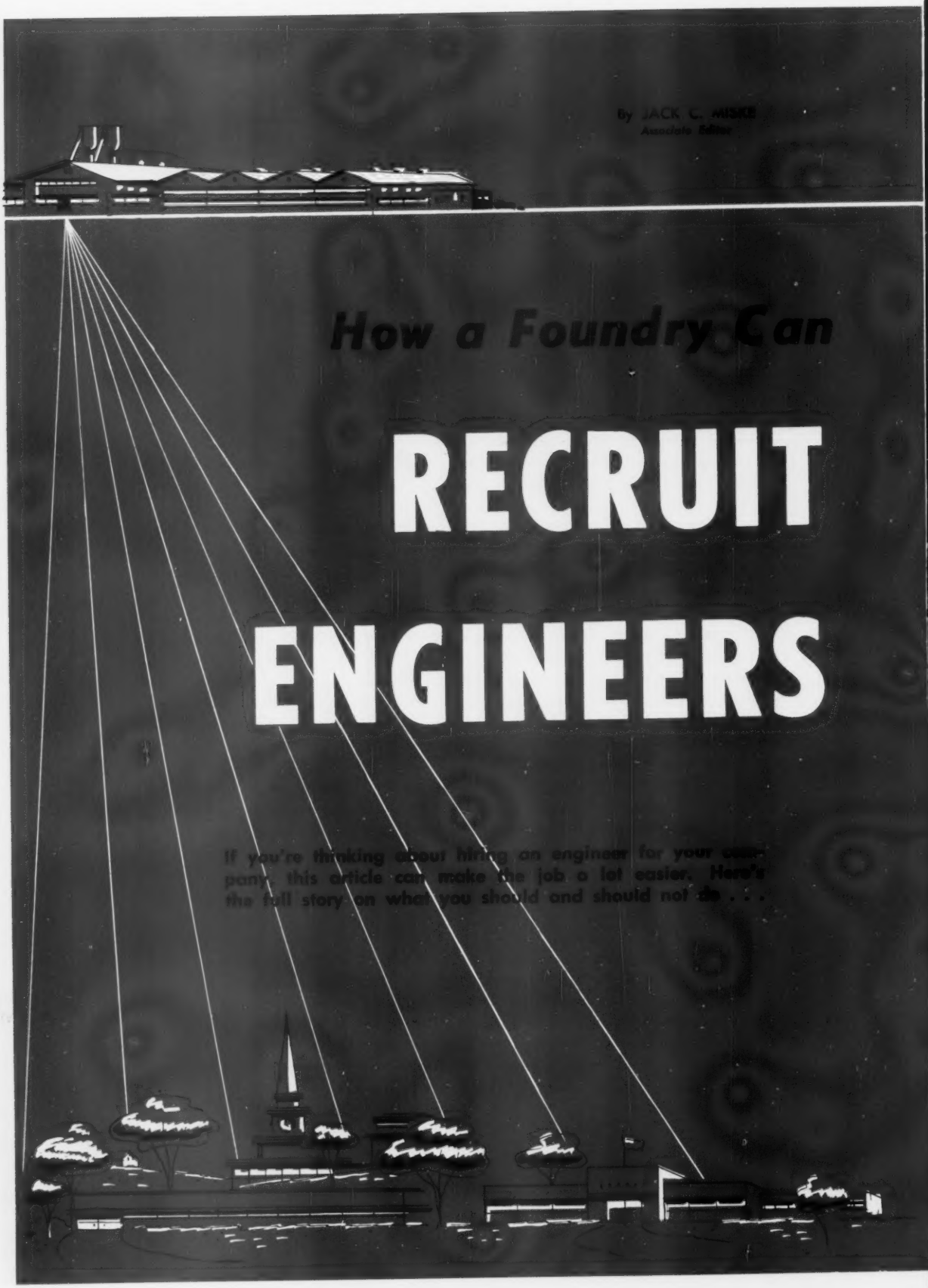
Greater utilization of machines will accentuate the need for more technically trained men. A good start in securing engineers for the foundry industry has been made in recent years, but many more foundries probably should be thinking about this problem at this time.

The Foundry Educational Foundation has created a climate that has interested young engineering graduates in the potentials of the foundry industry. But actual recruitment is the sole responsibility of the individual foundry.

How do you go about this job of recruiting engineering graduates? The answer is presented on the following pages. Interviews with a number of foundrymen who have been successful in recruitment have permitted Jack Miske to develop suggestions that should help foundries of all sizes and all types to move into the problem of preparing to meet tomorrow's needs for castings.

Frank G. Steinebach
Editor





By JACK C. MISKE
Associate Editor

How a Foundry Can

RECRUIT ENGINEERS

If you're thinking about hiring an engineer for your company, this article can make the job a lot easier. Here's the full story on what you should and should not do . . .

IT often has been said in recent years that the foundry industry is making the changeover from an art to a science—and in general it is. One result of this transformation has been a growing need for trained technical personnel, particularly for engineers. As many foundrymen have discovered, however, wanting an engineer is one thing and getting him is another.

The shortage of engineering personnel is the result of a number of factors not pertinent to this article. What matters is that the shortage exists and is likely to continue in the foreseeable future.

On the other hand, engineers *can* be had—some 30,000 in all fields were graduated last year. Largely through work of the Foundry Educational Foundation, that number includes some foundry specialists as well as many others in mechanical engineering, metallurgy, etc., who have taken foundry courses and can work in a foundry as well as anywhere else. The problem is to get them and to keep them. This article concerns the getting. Keeping them will be covered in a later article.

Where To Begin—The starting point for the whole process involves the attitude of foundry management. To put the matter bluntly, don't even look for an engineer until you're absolutely sure about these three things: 1. You need him. 2. You want him. 3. You want to help him become a happy, productive employee.

If your needs are such that you require an engineer's know-how, you probably do want him, but don't do anything until you're certain. If you proceed on any other basis, you're starting with a couple of strikes on both you and the engineer.

Let's assume that your thinking is perfectly clear on this subject. Everything indicates that engineering know-how can reduce your unit costs, increase the quality of your castings, or otherwise improve your operation. What do you do to get that know-how?

Determine Requirements—As the first step in actual recruitment, determine your engineering manpower requirements. The larger the foundry, the more complex the problem will be, and it isn't made easier by the fact that the best approach is a long-range one in which you look as far into the future as possible. Factors which enter into this determination include the following: Expansion plans, production methods, fields of specialization, personnel turnover rate and probable losses of older employees through retirement or death.

With a clear picture of your requirements, you're ready to look for the man or men to fill them. For the sake of convenience, we'll assume that you want one man. In this seller's market for engineering talent, he isn't likely to come to you, of course. Consequently, you must go to him. What's more, you very probably are going to have to sell him on the idea of coming to work for you. Boys at some schools are getting as many as 50 or more offers.

Three Approaches—There are three main avenues of approach: 1. Through college placement offices. 2. Through faculty members. 3. Through summer employment of undergraduates. Some foundries, particularly the larger ones, may find it worthwhile to use all three. Others, especially small shops, may find the second and third methods easier and more effective when they are practicable.

Placement Offices — Virtually all colleges and universities have set up placement offices to aid both students and recruiters. They are, actually, the official contact, and most recruiting is done through them.

The mechanics of this sort of recruiting are simple. As early as July of the preceding year, and no later than December, send out letters to placement directors at the colleges you wish to visit. Foundries probably would restrict these schools to FEF institutions or those affiliated with the FEF. The point here is not that you should talk only to FEF scholarship holders, but that engineering students at such schools are more likely than others to have had foundry courses and to be receptive to offers from companies in the industry. Wherever possible, it also is wise to go to schools in the area of the company. Graduates are more likely to want such an arrangement and less likely to leave when they work in the region where they have lived previously.

In your letters, give details about your company and the specific job requirements you have in mind. Spell out the kind of educational background you prefer. Since schools do not have identical recruiting periods, ask for mutually convenient dates.

Two or three weeks before the date decided on, send the placement officer literature about your company. A special recruiting booklet is fine if you have one or wish to prepare it, but it isn't neces-

WHAT STUDENTS ASK ABOUT

1. What sort of opportunity is there for personal development and advancement?
2. Is there an opportunity to do interesting and creative work? (This point is important, and it requires a selling job on the part of foundries. Students tend to think of jobs in such industries as aircraft and electronics as glamorous.)
3. Is there an opportunity to do graduate work in the community or in a nearby university?
4. Is the plant location in the engineer's home area or in one which otherwise makes it an attractive place to live?
5. Salary. (Remember that it's important to meet the going rate. A small favorable differential often is tempting, but most engineers are more interested in long-term advantages of a given job.)
6. Security and fringe benefits.
7. How are working conditions? (Good housekeeping, safety programs and wholesome employee relations pay off in this area, too.)

Recruiting engineers takes a selling job—some students receive as many as 50 offers

sary. Ordinarily, copies of your annual report and sales and product literature, etc., will fill the bill.

When you send the material, remind the placement officer that you're coming and ask how many interviewees he thinks you can expect. Don't plan on seeing more than 10 or 12 in a day. Interviews ordinarily run to about 30 minutes each. If the placement officer is on the ball, he will rough-screen prospects so that you see graduates with the right educational and job-interest backgrounds. Most schools provide the recruiter with a personnel card which provides vital statistics about the student.

The Interview—Conduct of the interview is extremely important. Don't lose sight of the fact that the boy will be sizing up your company just as much as you or your representative will be looking him over. He'll probably ask questions, and they often are searching ones. Frank, honest answers obviously are the only kind to make. They're more effective than any others in the long run. You not only want to hire an engineer; you want to keep him, and you want him to be happy and productive.

To begin with, the recruiter should be of some stature in the company. He must be personable, well informed about the company and what it requires, and patient. He'll have to go over the same material with something approaching the same enthusiasm in each separate interview. The man who heads up personnel and public relations is a common choice for the job.

A point to remember is that graduates who have not been a part of the FEF program probably will have to be sold on the foundry industry as well as on your particular company. In this respect, companies with diversified needs undoubtedly have an advantage over others since they can offer varied types of opportunities, both before and after hiring. Small shops, on the other hand, can point to the interest and challenge of a position in which an engineer may be involved with almost anything that goes on in the shop.

As a rule, graduates don't demand that their future be spelled out for them. They want to know about the company and its employee relationships, what salary they will begin at, some idea of their financial future, and what opportunities are for advancement. Most are interested in fringe benefits—pension plans, hospitalization, insurance and, occasionally, vacations.

The Salary Problem—Salaries for engineers have received a lot of publicity in the last couple of years, but realities of the situation probably have been exaggerated somewhat in the minds of many persons. Because his kind is in short supply, an engineer is likely to come a little higher than most business administration or liberal arts graduates—but ordinarily not more than $25 a month higher. Current indications are that most companies this year are offering engineers about $450 per month to start. A few may go as high as $475.

Actually, as indicated above, salary isn't of overriding importance unless your offer is below average. Some of the companies which start highest don't offer much in the way of future raises, lack of which breeds discontent. This instance is one in which you're better off to stick to the average and count on other inducements to persuade the man you want to take your offer. Don't be discouraged just because your company isn't a large one, either. Placement directors report that many graduates express a preference for smaller companies and are disappointed that relatively few such firms show up at recruiting time. The big fellows don't hold all the chips. What you're more likely to encounter is lack of information about your industry and consequent reluctance to join it.

WHAT THE FOUNDRYMAN CAN DO

1. As regularly as possible, visit the campus or campuses at which recruiting will be done.
2. Try to make personal contacts with both students and faculty members at college and industry meetings.
3. Hire students for summer employment.
4. Invite students and faculty members to visit the plant.
5. Give frank answers to questions about the plant and the foundry industry. In the long run, overselling won't pay off.
6. Be sure that the interviewer is in a position to provide full, accurate answers to students' questions.
7. Be as specific as possible about the job that's offered.
8. Use common sense and courtesy in dealing with prospects.
9. Co-operate with the Foundry Educational Foundation and with the colleges.

Sketches illustrate main approaches to recruiting engineers. Left to right: Through college placement offices, through faculty members and through summer employment of students before graduation

Looking Them Over—In your own appraisal of graduates, look for several things. Don't concentrate on grades. In fact, you might as well assume that a man who has earned an engineering degree has done a pretty good job. Most recruiters are concerned primarily about finding a well-rounded man—that's in terms of his character and intellect, not his figure. School activities, eagerness, compatibility, responsibility and similar qualities are important. Your evaluation has to be made in terms of what you want the man to do.

A research man, for example, need not be as gregarious as one whose work involves a great deal of personal contact. Sales personnel ordinarily should be somewhat the extrovert type—personable and friendly. Operational personnel need to be able to get along with others and to avoid any friction or jealousy on the part of older, non-college-trained employees—particularly on supervisory levels.

Military Service—In this cold-war age, the problem of military service is unavoidable. In terms of a long-range program, the best thing to do is to ignore it, for 75 per cent or more of engineering graduates face such service. If your needs are immediate, the problem is different, and you may have to pay a little more for an older man with his service behind him. The trend today seems to be not to consider the prospect of military service except in special circumstances.

Following Up—If you're favorably impressed at the conclusion of the first interview, you may want to speak to a graduate at greater length. Check with the placement office first, but usually there is no reason why you can't arrange for a private interview—perhaps at dinner, for example—if the graduate is interested, too. You may find it smart to meet his wife if he is married. If you can convince her that her husband should accept your offer, you'll probably have a new employee. Her opinion might very well make the difference.

Closing the Deal—Most experienced recruiters agree that it's best not to seek immediate commitments—that is, don't try to hire a graduate on the campus on the basis of your interview. They have a couple of reasons for this viewpoint.

For one thing, both you and the graduate can be more sure of what you're doing after he has visited your plant. Such a visit has come to be pretty much standard procedure. It gives both parties a chance to know each other better and to put future relationships on that much more solid a footing. Expenses of the plant visit almost invariably are paid for by the company.

The second point also concerns the matter of the future relationship. First, most graduates are reluctant to take any offer until they have completed their interviews with any other companies in which they are interested. Second, the man who chooses your company *after* he has seen everyone is much more likely to be confident about his decision than one who is bothered by the nagging fear that he may have passed up something better by taking your offer too soon.

Once the interviewing has been completed, promise the graduate a speedy decision, then send your notification earlier. Even if you're sure a man isn't the one you want, don't brush him off—he may hurt your chances with the fellow you *do* want. Notify everyone by mail or telephone, preferably within a week after the interview. Don't forget, however, that your making an offer doesn't close the deal. Your choice probably will want to complete his interviews before he makes up his mind—and, as we noted earlier, that's the best way for both parties.

Faculty Contacts—The second approach to recruiting is through the faculty members who teach foundry courses. It's a more personal method and offers a number of advantages, especially for

Conduct of the interview is extremely important. The student will be sizing up your company, too

small foundries. Where it is practicable, it permits interviewing under much more favorable conditions than the impersonalized placement office interviews. Further, faculty members can indoctrinate the graduate about the industry before you talk to him, and faculty opinion carries considerable weight with most students. In addition, faculty members are in a position to advise recruiting foundries as to which of their students are most likely to fill their needs.

Go Through Channels—Alluring and rewarding as this approach can be, it isn't without its difficulties. One point is of particular importance: Don't go over the head of the placement office. If this sort of contact with graduates is contrary to a school's policy, don't ask faculty members to get in hot water by bird-dogging engineers for you. Always check to be sure that the procedure is acceptable to the placement office, the engineering school and the faculty member's department.

Where there are no objections, most faculty members are glad to co-operate. Common sense tells us, however, that no teacher is going to give enthusiastic help to a foundryman who never shows his face except when he wants something. If you want help, you should be willing to give it, too. In other words, it's wise as well as courteous to get to know the men who make the engineers and to give them whatever help you're able to.

The FEF Program—This help can take many forms. For one thing, if you're going to reap a harvest from the FEF crop, you might provide some of the fertilizer—that is, get into the program and support it. Currently the FEF schools number 16 in locations from coast to coast. In addition, several dozen other institutions are FEF-affiliated schools.

They have volunteered to co-operate with the FEF even though they receive no financial support from it. They receive and disseminate FEF literature, register their students with the FEF and in general do what they can to help the foundation and, thereby, the industry. The FEF would be happy to bring some of these schools into its program if funds were available to permit them to do so. Between them, these two groups include virtually all colleges and universities which offer foundry course work.

The Personal Touch—Foundrymen also can get to know and help schools and their faculties on an individual basis. Make it a point to meet the men who teach foundry and related courses and to learn about their problems and needs. These men attend regional conferences, AFS conventions and other industry meetings, and you'll find them easy to approach. If you're able to, help them in whatever form you can—with equipment and supplies, summer employment for students or in any other fashion circumstances suggest. Visit the campus, and invite faculty members to visit your plant. Your help here need not be based on purely selfish motives. Such aid benefits not only you, but everyone concerned and the entire industry.

Summer Employment—The preceding paragraph mentions summer employment, a subject which merits considerable attention in itself. In line with the long-range planning which was mentioned earlier, summer employment can be one of the most fruitful means of recruiting engineers who will do a job for your company and the industry as a whole. Both the FEF and most of the schools maintain lists of students who wish such employment. They will be happy to furnish you with names of such students in your area.

When a boy works in your plant for one or more summers, a number of advantages accrue. For one thing, you're obviously on the inside track in the matter of getting him to work for you after graduation. You have had a chance to take a long, close

Many recruiters find it smart to meet the wives of the married students whom they want to hire

look at him and his capabilities, and he in turn has been able to decide what your company and the industry can do for him and his future. When you offer a job to such a graduate and he takes it, the probability of a mutually productive relationship is greatly enhanced.

Beyond that—and here we touch on the area of our second article, on training—the graduate engineer who has worked in a foundry during his schooling will be considerably ahead of one who has not. This point is particularly meaningful if he has worked in your plant, for he obviously will be familiar with your products and their production. In fact, he already has gone through a training period and may be ready to move into a position of responsibility without delay.

A Word of Caution—One danger spot has to be avoided here, as it does during training periods for graduates, too. If you bring a boy into your plant for summer work, use his capabilities. Don't, in the traditional example of what not to do, put him to work washing windows. He should be ready and willing to work, but not at tasks which have no connection with the foundry industry as such.

Even when you do give him a job which is part of the foundry process, give it to him as training, not as a job. He isn't going to be a molder or a coremaker. Don't keep him at one thing beyond the time it takes for him to familiarize himself with it. He's a potential engineer, not an apprentice. If you treat him like an apprentice, you probably will antagonize your other employees at the same time you're discouraging the student engineer's inclination toward the foundry industry.

FOUNDRY EDUCATIONAL FOUNDATION SCHOOLS*

University of Alabama
University of California at Berkeley
Case Institute of Technology
University of Cincinnati
Illinois Institute of Technology
University of Illinois
University of Kentucky
Massachusetts Institute of Technology
University of Michigan
Michigan State University
Missouri School of Mines and Metallurgy
Ohio State University
Pennsylvania State University
Purdue University
University of Wisconsin

*Information about other schools which offer foundry instruction on the college level is available from the Foundry Educational Foundation, Terminal Tower, Cleveland 13, Ohio.

The co-op plan works best when you operate with two students who alternate on the job each year

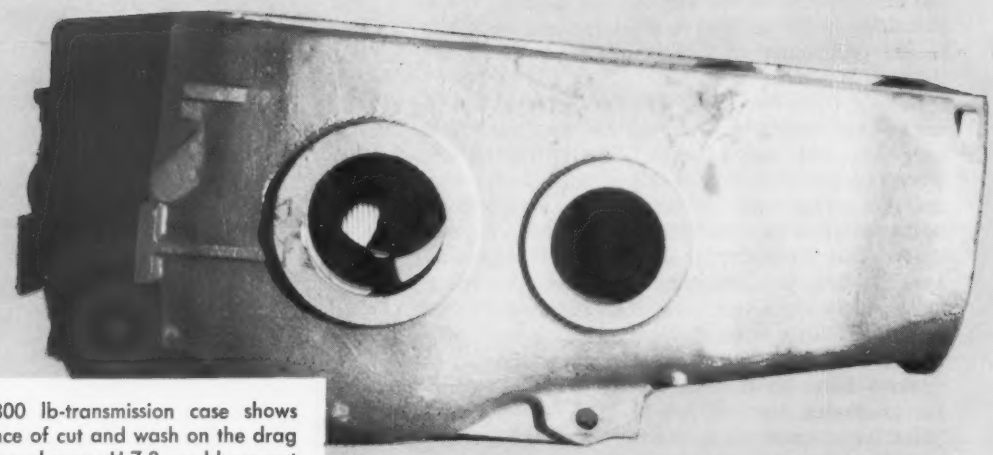
Co-op Students—One more area remains to be covered—students who are attending school on what commonly is termed the co-operative or "co-op" plan. Such students generally spend six months a year in school and six months on a job in industry. Again in terms of long-range planning, this plan offers the same types of advantages as summer employment, but, if anything, in greater measure. You have the same opportunities for mutual observation, pre-employment training, etc. And you must beware of the same danger of giving such a student the wrong job or of keeping him at a job too long.

Ideally, the co-op plan works best when you operate with two students, each of whom holds the same job for half of the year. Actually, not many schools offer this sort of program, but it's one worth looking into if your company happens to be in an area where the opportunity is available.

Making Your Opportunities Known—To conclude this analysis of recruiting techniques, here's a list of some of the things every company can do to make itself, its industry and the opportunities of both known to engineering students.

1. Visits, on as regular a basis as possible, to the campus or campuses at which your recruiting will be done.
2. Personal contacts with students and, especially, with faculty at both industry and college meetings.
3. Summer employment.
4. Plant visitations by both faculty and students.
5. Institutional-type advertising in college and alumni publications.
6. Posters which tell the story for your firm.
7. Co-operation with the FEF and with the colleges.

—*The End*



This 800 lb-transmission case shows evidence of cut and wash on the drag which sand over pH 7.8 would prevent

Practical pH Control

for Molding Sand

Various advantages can be gained from a knowledge of changes in the alkalinity and basicity of sand. This article clears up some of the confusion on the pH content of sand and its effect on casting quality

By EDWARD C. ZUPPANN
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DURING recent years many foundrymen have discussed the pH factor in sand control. Every discussion group has "for" and "against" people. One company claims its sand has a high pH and therefore is better. Testing may show that the sand mix is not as good as one with low pH. Some literature advocates use of a sand with a neutral pH of 7.0 for no better reason than that it is neutral. Foundrymen have tried adding soda ash to molding sand to reduce scabbing. For a few it helped; for many there was no effect. Good castings have been made at pH values of from 5.0 to 9.5. Poor castings have been made in the same range.

Why the Confusion?—The confusion regarding pH stems from: 1. Lack of understanding of the meaning of pH. 2. The erroneous thinking that test mixes of all new materials get us "back to the fundamentals." 3. Lack of appreciation of the complex nature of molding sand.

Is there really something, then, to this chemical treatment of molding sand? Is it more than a passing fad? Is pH control a part of good sand control?

Some advantages can be gained from a knowledge of the changes in acidity or basicity (alkalinity) of sand. Many foundries already practice pH control without knowing it. A few sand systems may need pH measurement and correction all the time. Many sand systems could benefit by occasional treatment at critical times. The checking of the pH value of incoming bentonite, fire clays,

natural molding sands, and sand additives may stop troubles before they begin.

Unfortunately, some foundries try new ideas with little preparation and study or with an inadequate testing and evaluation program. Results are poor. Consequently, many who could use pH control to advantage are afraid to try it because of the poor experimentation of others.

What Is pH—For all practical purposes pH value represents the acid or basic character of a material in solution. A pH value of seven is neutral. Values below seven are acid; those above are basic. Strong acids have pH values near one, while strong bases are near fourteen. These statements, taken by themselves, are an over-simplification; they can cause some misunderstanding. It must be remembered that pH is somewhat independent of concentration. Thus, if potassium-hydroxide is dissolved in water the result will be a highly basic solution. The pH will change little even though a great amount of water is added.

Sometimes it is not necessary to know whether a material is acid or basic. Rather, it may be important to know the relative position of two materials on the pH scale. For instance, two additives could be acid but one be more acid than the other. An acid sand with a pH of 6.0 may be good molding material. The same sand at a pH of 5.0 or 7.0 may produce defective castings. The big point to be remembered here is that pH is a measure of one factor in sand control. It is a tool for finding out more about the complex nature of molding sand.[1] The ability of a sand to produce good castings depends on good practice which must include the control of pH in the best range, regardless of whether it is acid or basic.

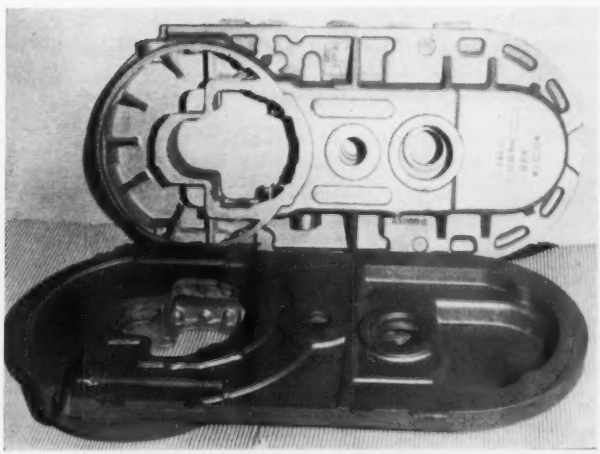
Almost everything added to molding sand is acid except western bentonite, a few lime-bearing sands and, frequently, water. The actual measure of pH, however, is new to molding sand practice.[1] But the various levels of acidity and bascity always have existed. For centuries foundries have produced castings without knowing the pH value of molding sands, but, probably, some additives were used to correct conditions caused by the wrong level of acidity or basicity.

Back To Fundamentals — No one will argue against getting back to fundamentals to check a new material or method. However, over-simplification of complex problems can produce inadequate, even incorrect answers. Consider one foundry's experiment to find the effect of pH on the formation of scabs. New sand, clay, and silica flour were mixed. Soda ash was added to part of the mixture —acetic acid to another part. Results indicated that scabbing was not influenced by either acid or basic materials. The conclusion reached was that the pH of molding sand was not important. Over-simplification gave an answer that was correct for the materials tried but not generally correct for the foundry. In this experiment silica flour was known to be the scab producing factor. Yet a change in pH was expected to eliminate the scab! Scabs and many other defects undoubtedly are caused by a combination of sand, molding and metal factors. To vary one factor such as silica flour and expect the changing of a second, pH, to bring the sand back to normal is asking too much.[2]

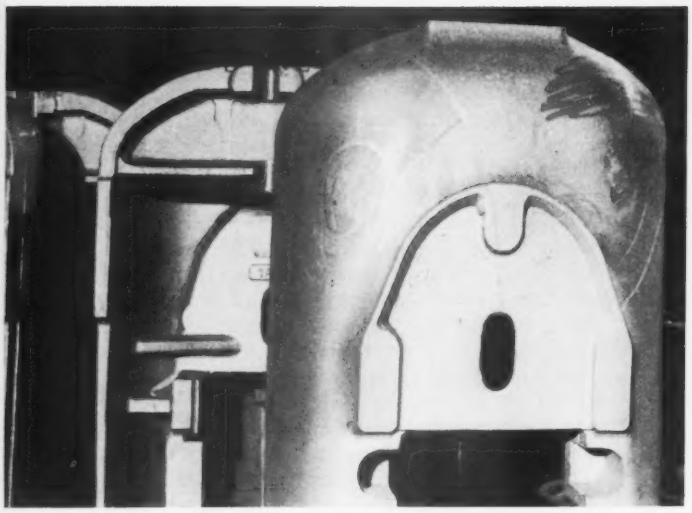
pH and Decomposition—There are two causes of change in pH. One is inherent in the materials making up a sand mix. The other is due to products of organic and inorganic decomposition of those materials. These products of decomposition and their effect on the castings are completely overlooked by the so called "back to fundamentals" experiments using all new materials. Only one of these scrap-causing factors is the change in pH due to the products of decomposition. Burned clay, seacoal ash, cellulose ash, chemicals from water and other factors also are important. Most foundrymen know that a facing of all new materials usually will give better results than used sand. In other words, used sand or system sand contains more factors for causing scrap than a mix of all new materials does.

It long has been known that the pH of a clay is an index to its composition.[3] Bentonite producers check the pH and sort the material so customers will receive a uniform product. The use of highly basic solutions to upgrade some non-commercial fire clays has been accomplished experimentally.[3] Fire clays and bentonites have the ability to change their chemical make-up if certain materials are used in controlling the pH. For example, western bentonite may be given some of the properties of southern bentonite by the use of various calcium compounds. Southern bentonite can become more like western through the use of sodium compounds. However, the choice of a highly basic material is not enough; other elements available for reaction with the clay also must be watched.

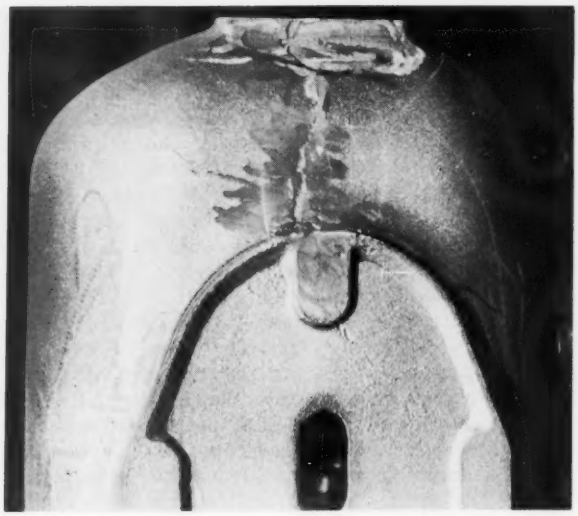
An interesting experiment was run on a southern bentonite used in the chemical industry. The material was very high in the bentonite mineral, montmorillonite. This material was mixed into a facing that usually gave 10.0 psi green compressive strength and 15 oz per sq in. tensile strength. Re-



A pH of over 8.0 prevented buckles on cope ring and scabs near center of this transfer housing



Cope side of tractor front frame produced without defects in sand with pH factor of over 8.5



Buckle and scab caused by either low wood flour with normal pH or low pH with normal wood flour

sults showed only 3 psi compressive strength and 2 oz tensile strength. The pH value of the mix was 4.5, which is normal for some southern bentonites. Through the addition of soda ash the pH was raised to 9.3. The soda ash-treated facing had 9.8 psi green compressive strength and 14.5 oz tensile strength. The experiment indicates that the primary influence of pH is directed toward the clay minerals.[3]

When Is pH Control Needed?—Usually the symptoms of need are varied and may take on unusual character. Here are a few of the most common: 1. A gritty feeling sand in which the grains feel larger than they should. 2. A sand which appears brittle while the deformation test remains high. 3. A tendency to more broken molds, drops, stickers, etc., on Monday morning than later in the day or for the balance of the week. 4. A sand that scabs at the same time cuts and washes occur. 5. A sour or spoiled-smelling sand. 6. An "ashes and water" feel rather than a loose fluffy sand that feels like "feathers." 7. Excessive scabs, cuts, washes, drops and broken molds upon starting a molding unit that had a low scrap record before being shut down for a week or more.

Aside from the original materials in the mix, those conditions are caused by two things. First, acid compounds are formed within the sand. The acids are derived from the spoilage of organic additives, giving organic acids, and from the decompositions of the sulphur compounds in seacoal. The former appears to be the most potent source of acid compounds. Second, insufficient new sand may have been added to the system to dilute the effect of the acid formation. Most systems have enough core sand entering each day to stay ahead of acid formation. Other systems must have new sand added to obtain the desired flushing.

Results of pH Control—At one foundry only one out of five molding units making agricultural castings did not respond to standard compounded sand practice. One of the good units made malleable castings in a southern bentonite, seacoal sand. The other three good units made gray iron castings in sand mixtures of southern and western bentonite or all southern bentonite bond with seacoal, wood flour and a small amount of corn flour. The poor unit was a sandslinger making larger castings in a sand mixture of southern and western bentonite with seacoal, wood floor, and a small amount of corn flour.

Castings poured in molds made by the sandslinger exhibited expansion scab defects, cuts and washes at the same time. In an attempt to cure the difficulty, natural sands, bentonites, fire clays, special additives, and combinations of these were tried. Each time the same bad condition reappeared three to six weeks after changing the sand. One of the most interesting facts of the case was that none of the results of the usual green sand tests changed. Even dry strength, hot strength, expansion, and hot deformation changed little.

TABLE I—Comparison of a Nonscabbing Sand Mix and a Production Mix

	Properties of Non-Scabbing Sands (AFS Committee 8J Report, 1951)[6]	Properties of Scab-Producing System Sand
Green compression strength	over 10 psi	14-16 psi
Rammed density	below 110 lb per cu ft	93-96 lb per cu ft
Green deformation	less than 0.021 in./in.	0.015-0.020 in./in.
Silt content	less than 8 per cent	0.3-0.6%
Dry strength	under 150 psi	65-75 psi
Hot deformation at 1000°F.	over 0.009 in./in.	0.016-0.018 in./in.
Permeability	over 50	100-125

Table I shows the tested properties of this scabbing sand compared with properties of a nonscabbing sand reported in 1951 by AFS Sand Committee 8J.[6] A comparison indicates that everything should

be correct for not producing scabs. Yet the castings had scabs! Some castings were consistently worse than others. Large, thin, cover castings showed no scabbing. The worst conditions were on heavy transmission cases and large heavy wheels.

The answer to the problem came after Zang and Grott wrote of their work on pH in molding sand in FOUNDRY.[4] The pH was checked on all five units with the following results:

System 1—Southern bentonite	pH 7.2
" 2—Southern bentonite	pH 7.0
" 3—Southern bentonite	pH 7.1
" 4—½ Southern, ½ Western bentonite	pH 8.5
" 5—½ Southern, ½ Western bentonite	pH 6.8
City water	pH 7.6
Southern bentonite	pH 7.0
Western bentonite	pH 9.3

Systems 1 through 4 have pH values that would be expected from a southern bentonite of 7.0 pH and a western bentonite at 9.3 pH. System 5, which gave the poor results, is far below pH that should be expected.

Commercial grade powdered soda ash ($Na_2 CO_3$) was added in quantities of about 1 qt per ton of sand. This amount had been found experimentally to be enough to raise the pH to 9.0. Immediate improvement was noted in castings.

The system in which the sand required treatment to raise its pH contains 80 to 120 tons of sand that is recycled two or three times a day. The control of pH required only one test every week and additions of 50 lb of soda ash every two or three weeks. The addition amounted to 0.0006 per cent per batch of sand passing through the muller.

Experiments have shown that the worse a casting finish is before soda ash treatment of sand the higher the pH has to be raised to prevent trouble. Castings made without trouble prior to treatment remained good at pH values as low as 6.5. Borderline jobs that could be produced properly only with extreme care in molding and pouring, required 7.8 or higher pH to give good results with ease. Castings that seldom were satisfactory were produced at a good quality level from a sand with a pH of 8.5.

Control of Natural Sands—A foundry using a natural sand had scabs on large castings. Western bentonite was added to an already rich sand. Wood flour then was added to make the sand more flowable. Wood flour without the bentonite caused cuts and washes to appear before enough could be added to stop scabbing. Tests of the pH values of various heaps showed:

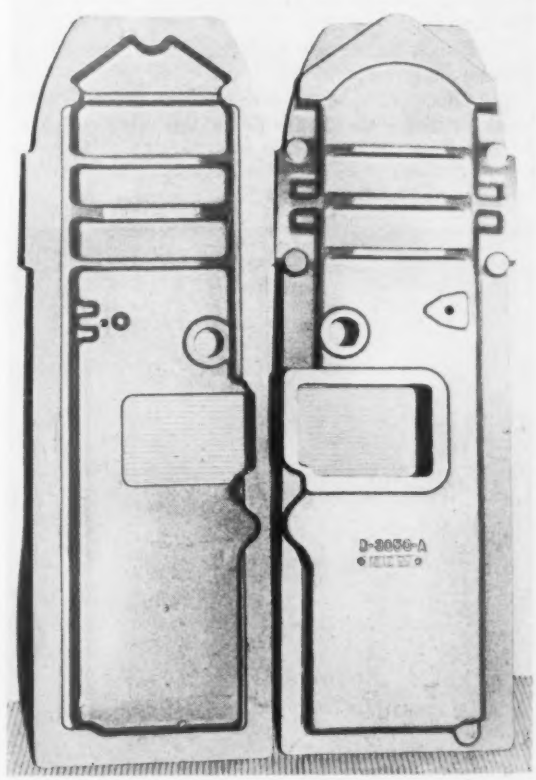
New natural sand	5.0 pH
Worst scab producing heap	5.0 pH
Scab producing heap	5.2 pH
Scab on a few jobs	5.4 pH
Good heap for most jobs	5.8 pH
Best heap for most difficult jobs	6.0 pH

Although western bentonite raised the pH, there is a question as to whether improved casting quality resulted from additions of clay or change in pH or both. Additions of southern bentonite did not decrease the scabbing tendency of this sand nearly as much as did western bentonite. This would indicate that pH was more important than the clay content.[2]

Control of Slurry Systems—Many operators add acid cellulose material (2.5 to 3.0 pH) to western bentonite mixes to reduce viscosity of the slurry and allow a greater percentage of solids to be carried through the piping system. A few foundries have reported improved workability of the sand when the acid is counteracted by additions of soda ash or other basic materials at the muller. One foundry adds 40 lb of soda ash for each ton of low pH cellulose used. The addition of cellulose amounts to 0.5 per cent of the return sand; the compensating addition of soda ash amounts to 0.01 per cent.

The choice of compounds to bring about changes in pH is important. Western bentonite is used for control in most slurry systems. Use of an acid calcium or sodium compound to reduce viscosity might be tried, with additions of a basic sodium compound such as soda ash to compensate for the acid material.

Other Defects Affected by pH—Some sand conditions influenced by the pH factor are at their worst when a unit is started after a shutdown of several days. The usual green sand tests may not show an unusual condition. However, a drop of 1.0 pH may occur. The pH can change as much



Cope and drag of a 100-lb cover which caused no trouble in sand at any pH value from 6.5 to 8.9

or more when the sand system is not in use as when castings are being made. Temperature conditions in unused sand are good for bacterial growth. Sand in use is too hot.

A case in point showed up after a ten-day shutdown on a medium-sized squeezer line. Complaints of not being able to lift cope pockets were voiced about 10 a.m. Green properties were in the center of the desired range. The pH had dropped from 8.5 to 7.5 during the shutdown. By 11 a.m. soda ash was being added. At lunch time the foreman reported all jobs lifting normally. A second foreman who used the same sand system reported independently that two normally good jobs showed scabs during the morning but cleared up about noon.

Experience shows that when sand is unused for a week or more, trouble is avoided by adding 50 lb of soda ash for 100 tons of sand. This treatment often is beneficial to units that usually do not need continuous pH control.

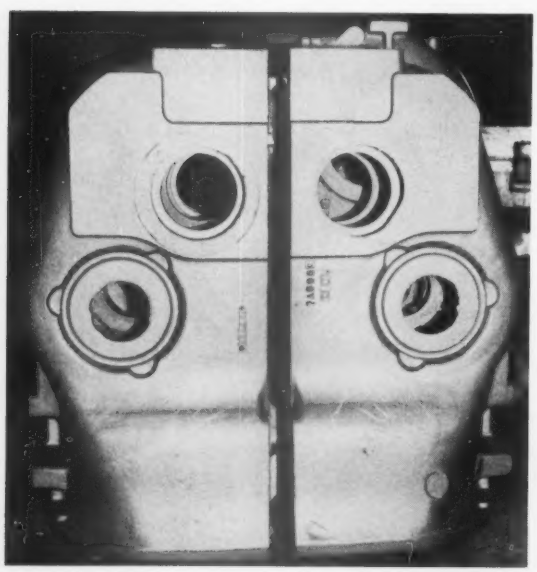
Is pH Control a Cure-all?—No it is not! Neither is moisture control alone or any other single property. Defects in castings usually are caused by combinations of several factors. If, by patient effort, one does beat down all the other contributing causes, pH may cease to be a controlling factor.

Here are some suggestions for setting up a pH control program:

1. Check all incoming material such as clay, seacoal, cellulose, cereal and sand. Any radical change in pH should be investigated before using the material.

2. Check an all-new material mix similar to the regular molding sand.

3. Check all systems or heaps for a period of a week or more to obtain about 100 tests on each.



Cope and drag of a 750-lb transmission case that was made without defects when pH was over 8.0

4. Compare the pH of systems or heaps that are considered good and have low scrap against those that are considered poor and have high scrap.

5. Determine the amount of chemical to use to change the pH to the desired value by mixing trial batches of sand and checking before and after chemical additions.

6. Select proper chemical by trial. (See Table II.)

TABLE II—Effect of Chemicals on Molding Sand

Soda Ash	(Na_2CO_3) Makes sand more basic. Widely used. Effect: To increase dry and green tensile and compression strength.
Lime	(CaO MgO) Basic material. Increases green strength.
Lye	(NaOH) Dangerously basic material. Increases dry and green strength.
Borax	($Na_2B_4O_7$) A weak base. Increases dry strength while lowering hot strength; lowers expansion and increases contraction after expansion.
Organic Chemical Compounds	Have no practical effect.

7. Adjust the pH up and down to determine the value that produces the best castings.

8. Adjust the pH of the poor units to match that of the good ones and establish quality control measures.

9. Do not overdo the additions to correct pH. Values over 9.5 should not be necessary.

The values in Table III are not given as good operating ranges. They show that good sands are to be found over a wide range of pH. Generally the higher the pH the more dispersed will be the clay.[5] This is one of the ways the clay becomes more active. There is a limit to the dispersion that can be obtained by raising the pH, which is different for each clay. For this reason each foundry must determine the best pH range for its own sand. —*The End*

TABLE III—Typical pH Values

Material	pH Range
Ohio fire clay bonded sand	3.5-6.0
Illinois fire clay bonded sand	2.5-5.5
Low pH southern bentonite sand	4.0-6.0
Some natural sands	5.0-6.5
High pH southern bentonite sand	6.5-7.5
Mixtures of southern and western bentonite bonded sands	5.0-9.0
Western bentonite bonded sands	8.0-9.5

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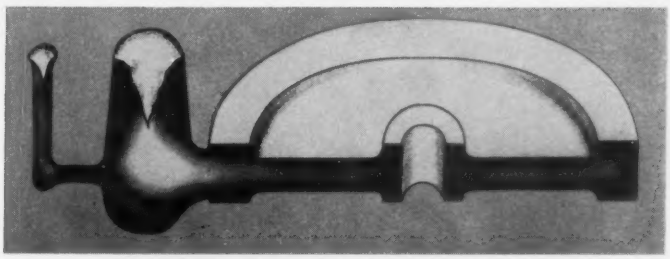

Fig. 1—Darkest shading shows this sheave hub solidifies early. One riser feeds the casting

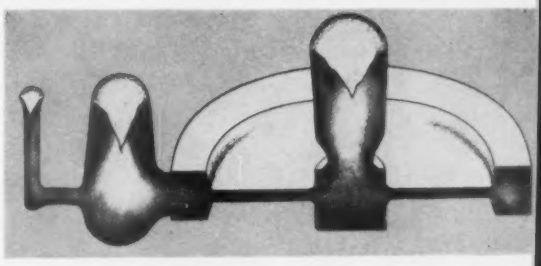

Fig. 2—Heavier hub with thin surrounding web may require a second riser for proper feeding

Design of

Gray Iron Castings

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and

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Design of gray iron castings This article is one of six sections of a 46-page booklet, "Design of Gray Iron Castings," published recently by the Gray Iron Founders' Society. It discusses design factors of primary concern to the foundryman. Material in the booklet is to be incorporated in the society's *Gray Iron Handbook*, which will be published soon.

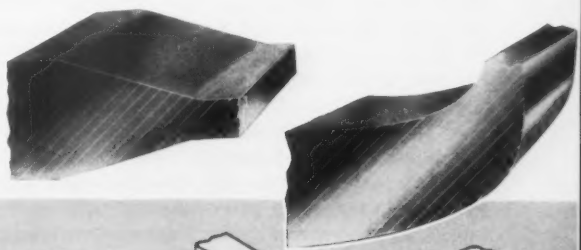
OBTAINING castings which are free from flaws is a continuing problem for the foundry, but most grades of cast iron are fairly good in this respect. The high fluidity of the molten metal and the low shrinkage during solidification permit successful castings to be made of some shapes which would be impossible with other metals.

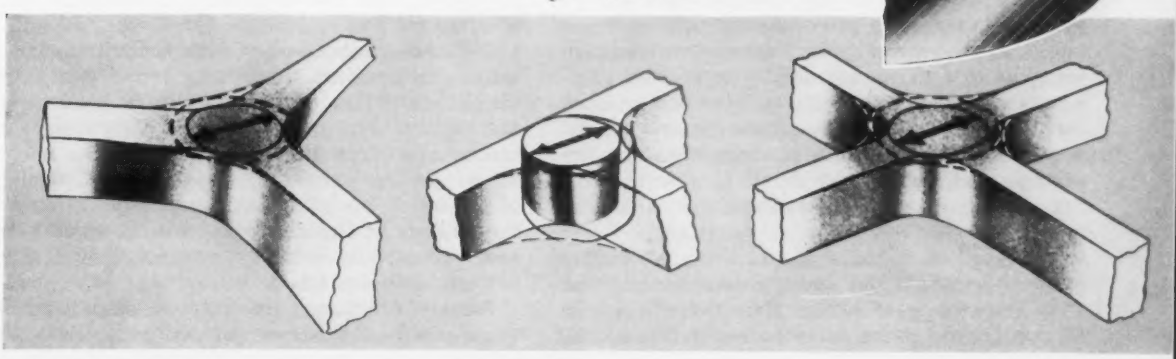
The following general comments on design are intended primarily as a guide for the less experienced designer. The man who has seen many castings go into machinery realizes that there are times when these precautions can be waived. On the other hand, some castings will be especially difficult to cast. Certainly, the foundries with experienced, scientific management and process control can be expected to produce good castings of a design which might cause a high scrap rate in some other foundry without these attributes.

1. The sequence of solidification in a casting affects the soundness of the casting. This is pri-

Fig. 3—Casting design using generous tapers between sections of varying thickness is desirable

Fig. 4—Usually larger radiuses are desirable, but in Y, T and X sections they have the disadvantage of increasing differences in section thicknesses





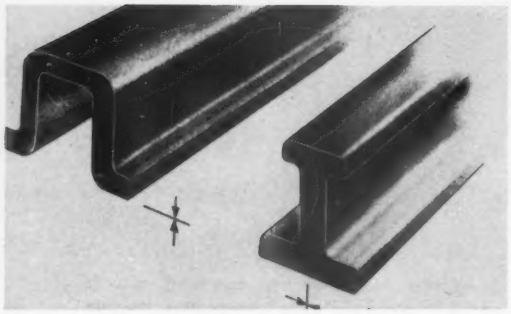


Fig. 5—U and I shapes avoid coring. Marks show preferred parting

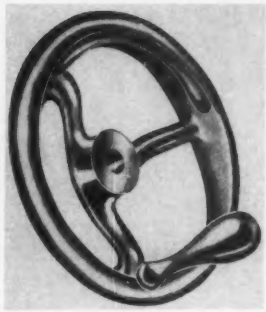


Fig. 6—Curved, offset spokes relieve differential cooling strain

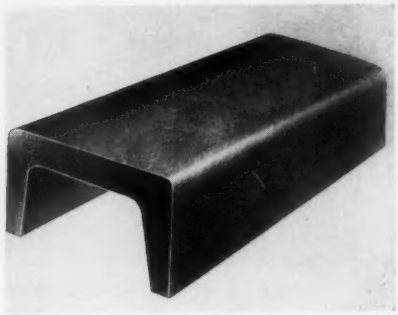


Fig. 7—Maximum draft allowances and radiuses are good in pockets

marily dictated by the shape of the part, but the foundry usually can help with changes in molding and casting techniques.

An example of a good sequence of solidification or directional solidification is shown in Figs. 1 and 2. The top sheave casting in Fig. 1 has a sufficiently light hub that the molten metal in it solidifies first after the casting is poured. The disk portion solidifies secondly and the rim is the last part of the casting to solidify. This is shown by the shading, the darkest areas having solidified first, the light areas last. The riser (shrink bob) is attached to the last part of the casting to solidify, and since all solidification was progressive to this point, the casting will be completely sound. (Solidification proceeded around the rim from the side furthest from the riser because the molten metal was cooled somewhat in flowing that far in the mold).

The casting in Fig. 2 has a heavy hub and rim separated by a thin disc that solidifies first. The foundryman must provide an additional riser to feed the hub; otherwise it would not be sound unless the casting were poured in a grade of iron which has no appreciable solidification shrinkage. Isolated heavy sections which are not readily accessible for risering may be cast satisfactorily by the use of mold inserts (chills). While the foundry can use a number of special techniques, dependence on these may delay production and can increase the cost of the casting. Minor design changes suggested by the foundryman can often minimize the need for special practice.

2. While adjacent sections of widely varying thickness can be cast, the foundry's job will be easier if the sections are connected with generous tapers, as shown in Fig. 3. Thickness variations in ratios up to 4 to 1 are generally no problem. Differences greater than this can often be handled, particularly if property requirements are not too severe, or if alloying is possible. The foundry engineer and metallurgist should be able to make helpful suggestions in extending practical limitations.

3. A good fillet radius should be approximately equal to one-half the average section thickness, with a minimum of ¼ in. Here there is a conflict of interest which must be resolved in special cases. Large radii favor lower stress concentrations, streamline flow of molten metal in the mold, and easier pattern withdrawal. The smaller fillets, however, avoid isolated concentrations of metal in a Y, T, or X shaped section. Fig. 4 illustrates this condition. The severity of the shrinkage problem is a function of the diameters of the inscribed circles. This consideration is of less importance when casting in gray iron than in other metals.

4. Care must be taken where an exposed, critical face is backed up by ribs and bosses. If these interior projections are very large compared to the face thickness, there may be a hollow on the face opposite the projections. Where the face is to be machined, a slight padding on the face side will avoid the dimple. When appearance is the only consideration, a decorative pattern on the face will minimize the apparent defect.

5. Core shifting should be guarded against by the use of ample support. Where a casting with a blind cavity is required, an extra core print sometimes can be used to advantage, even though it results in an unnecessary opening. Chaplets should be used with caution, since it is sometimes difficult to obtain effective fusion.

6. Cores in beam-shaped members can sometimes be avoided by replacing tubular sections with U or I-type open sections, as in Fig. 5. This helps provide better castings by eliminating the cores. On the other hand, a core is sometimes used in a large hub where a hole is to be machined. This is done even though it would be no more expensive to drill out a solid hub, if use of the core decreases the casting thickness ratio. However, a core that is thinner than the metal section around it may also be a problem.

7. Complicated castings with concentric structures sometimes are troubled by cracks caused by the differential cooling of the various sections of the casting. Fig. 6 shows how a handwheel rim can be offset from the hub to allow for the relieving of cooling stresses. A small, uneven number of spokes or curved spokes would help. However, the millions of straight-spoked wheels which have been successfully cast are evidence that this is not commonly a problem.

Factors Affecting Casting Costs—It is possible to approach the subject of cost reductions by

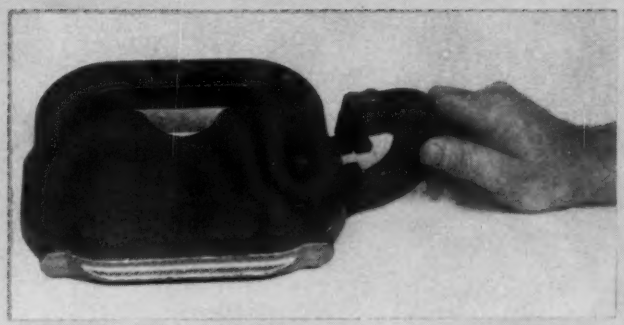


Fig. 8—Adjustable go, no-go gage is used to measure casting thickness. At left, simple milled plate gage is employed for checking cored hole locations

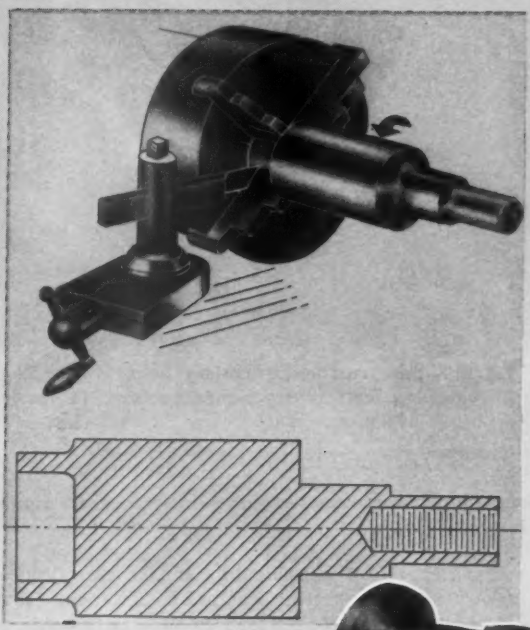


Fig. 9—A chucking grip can be added to castings requiring machining all over. It then is removed

Fig. 10—Clamping pads also may be designed as a part of the casting and later removed or left on

studying the elements of casting costs. This is a joint responsibility of the designer and foundryman.

1. Direct Costs

a. The number of cores, their size, and complexity, are important cost factors. Also to be included are core preassembly, gaging, installation in the mold, and chaplets (when used). Changes in design that permit green sand cores are worthwhile, as is the consolidation of cores. Cores rugged enough to be made without internal wires or rods are less expensive than those which require reinforcement.

b. Unit pattern costs are determined by the total cost of the patterns, matchplates, coreboxes, core driers, and special flasks, if used, divided by the estimated quantity of castings to be produced. On long runs an allowance for maintenance should be included. The principal cost reduction possible is in the elimination of cores and, consequently, coreboxes.

c. The quantity involved is a factor in costs, in that it determines the type of pattern and molding equipment used. The daily or monthly rate may be more significant than the total quantity. This determination of economic lot size has been studied and used by experts in many fields. The principles also apply to castings.

d. The cost of cleaning castings is a surprisingly high percentage of the total cost. Castings with small gates and risers require a minimum of hand grinding. If gates and risers are located on unimportant faces, they may not require any work. A plane parting line is most easily cleaned. Cores positioned by several generous core prints not only are more easily and accurately located, but can be cleaned out more economically and thoroughly. Castings rugged enough to be tumbled can be cleaned with less handling.

e. The type of metal used affects castings costs directly. An increase in the percentage of rejected castings may result from the selection of a material not having the best castability.

f. Minimum radii and draft allowances in internal green sand pockets may cause molding difficulties. Fig. 7 shows an exaggerated example of recommended practice.

g. The molding time for uncored castings is about the same, regardless of design complexities, for a given flask size, when using mounted patterns and mechanical molding equipment. Thus, multicavity molds are a clear advantage, and there is no cost penalty for the addition of extra elements or detail.

These direct costs factors are all replaced by a single cost when the castings are obtained from an outside supplier, or if a comprehensive cost-control system is in use in a captive foundry. This

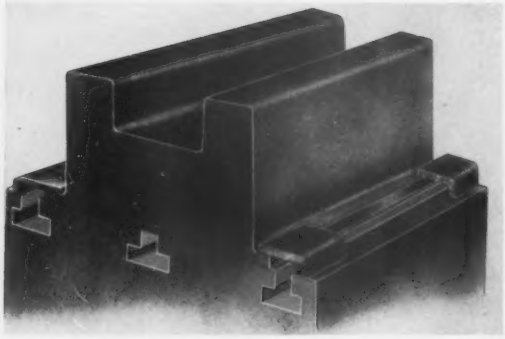


Fig. 11—Lugs cast on a casting help in clamping casting to planer table

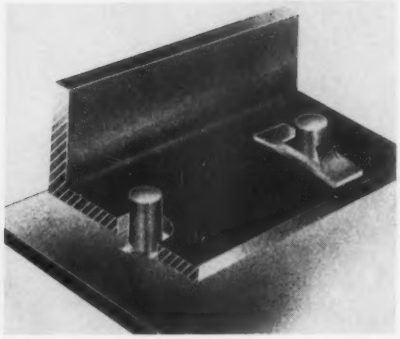


Fig. 12—Cast-on bosses can help in fastening cast iron assemblies

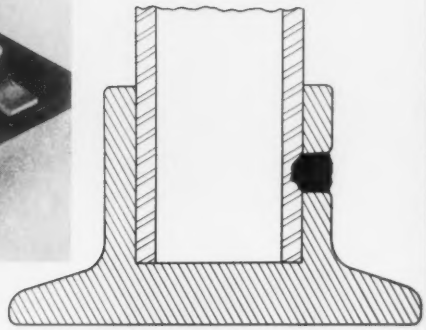


Fig. 13—Steel tubing may be anchored in an iron casting with a weld plug in a cored hole

means that it is possible to compare two alternative designs by getting quotations on each. However, the indirect costs should also be considered for a complete analysis.

2. Indirect Costs

a. The cost of machining is frequently the major item in manufacturing. The machinability rating of the iron, the volume of material to be removed, and the use of locating fixtures are all involved in casting design. There are some cases where casting design is responsible for defects which are not discovered until part of the machining has been completed. The cost of this wasted machining should be considered a charge against this particular casting design in the cost analysis. The foundry's liability is limited to the replacement of defective castings.

b. Assembly operations are simplified with accurately gaged castings which fit mating parts. Shown in Fig. 8 are typical gages for checking casting dimensions. A reduced number of parts will usually reduce assembly costs.

c. Lighter, more compact, and more rugged castings result in lower transportation and packing costs from the foundry to the manufacturer and throughout the distribution system.

It is possible to go beyond these cost considerations to attempt a comparison between a casting and a part made by an alternative process. However, this is an exceedingly difficult job, as all of the direct and indirect factors in both processes must be considered, and the two parts must be comparable in all respects. Even with these requirements satisfied, no general conclusions between processes can be drawn, because change in time, location, and company policy will affect the balance.

3. Design Tips

a. Projections can be added onto castings to facilitate clamping for machining. Where parts are to be machined all over, a chucking grip (Fig. 9) can be provided, to be cut off as the final operation. The machining sequence is then comparable with that on an automatic screw machine.

b. Awkwardly shaped parts can be handled in standard chucks with the addition of clamping pads, as in Fig. 10. These pads may be inconspicuous and left in place or cut off when necessary. Where machining fixtures are provided, the pads serve as locating points. Some foundries can supply targeted castings in which these locating pads are accurately ground with respect to the body of the casting.

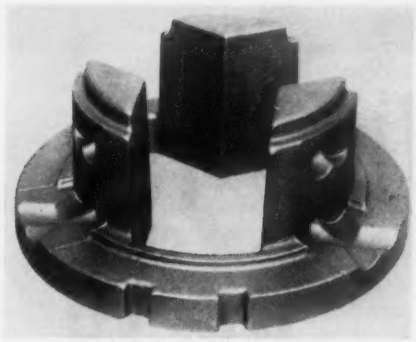
c. Clamping large, straight-sided castings to a planer table is simplified if projecting lugs are provided for the purpose. Fig. 11 shows how small clamps can be used and the entire face left clear for machining.

d. Cast iron is a logical choice when weight is important for stability, because of the low cost of iron in a given casting. It is used to lower the center of gravity of mobile equipment, to increase weight to prevent sliding, and to counterbalance moving or rotating parts. These masses can be made very economically in cast iron, with the further advantage of molding a shape to suit the space available. The greatest economy is obtained when these masses are incorporated as an integral part of the machine body. Crankshafts are an important application of this technique.

e. Fastenings can be incorporated in design by using as-cast bosses, with push-on-type spring clips. Fig. 12 illustrates one possible application of this method. Riveting is applicable to cast iron assemblies by using tubular rivets and rolling the lip down without impact.

f. It is sometimes necessary to secure a cast-iron flange or bushing onto a steel tube or bar. A reliable anchor can be obtained by coring a side hole in the casting and arc-welding a button in this hole on assembly, as in Fig. 13. There is no need for fusion with the casting, since the lock is purely mechanical. Actual brazing or welding is also practical.

g. Some parts can be handled better in production as a set, rather than singly. Fig. 14 shows a case where three parts were cast as one, with considerable advantage in handling and machining.



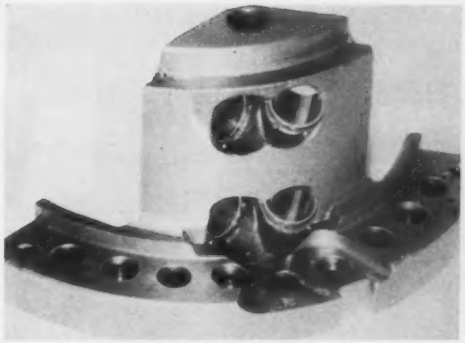


Fig. 14—Some parts can be handled better in production as a set, rather than singly. As an example, the three parts at left above were cast as a unit. After machining, they were cut apart as shown in the center view

Fig. 15—An edge bead simplifies the registering of some mating castings and improves appearance

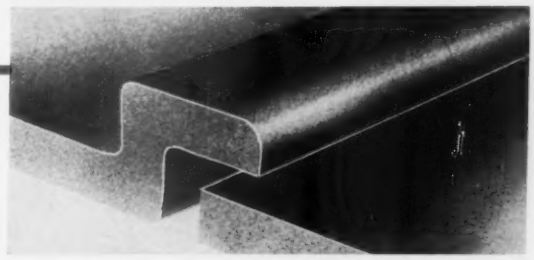


Fig. 16—A cast lap will hide the joint between two castings having unmachined, butting faces

They were turned, milled, and bored before being cut apart.

h. Some intricate coring can be eliminated if a casting is made in two halves with a brazed or bolted connection of the halves. This is especially desirable if the core prints are so small that support would be inadequate, and clean-out difficult. Automotive automatic transmissions use control-circuit blocks of this type.

i. The problem of registering mating castings can be simplified by providing a bead on the edge of one of them. Fig. 15 shows this arrangement. The customary range of casting tolerances can be accommodated this way, in addition to providing a decorative belt.

j. Where two castings to be joined without any machining of the butting faces, the irregularities can be covered with a stepped joint. Fig. 16 is an example of this cost-reducing method.

Casting Tolerances—It barely needs to be stated that there are direct benefits from close casting tolerances. For small and medium sized castings, there is the possibility of assembling unmachined castings. In general, the amount of metal to be machined is affected by casting tolerances.

For ordinary green sand molds, the closest tolerances can be held between points in one part of a flask, the greater error being across the parting line. The following list suggests the basis for the usual tolerance buildup:

1. Pattern deviation from the drawing. This is usually $\pm\frac{1}{32}$ in. per foot.

2. Localized casting shrinkage deviation from the shrink allowance. This results from a minor error in judgment by the patternmaker in estimating the actual shrinkage resulting from the casting shape and molding conditions.

3. Warpage can be considered as result of the restrained cooling of the casting. It results from the inability to predict accurately, in complex cases, which portion of a casting will solidify and cool first.

These three size factors are correctable by reworking the pattern, or by modifying the molding practice. For quantity production, this trial-and-error approach is entirely practical and these errors can be eliminated. However, the following production variables remain inherent in the casting process:

4. Molding variables may include pattern rap, core shift, sand pressure, mold growth, and shake-out time. Machine molding minimizes most of these variables.

5. Metal differences are usually in shrinkage, pouring temperature, and rate of pouring.

Naturally, when extremely close limits are required, there has to be a correspondingly good surface finish. Since there is no specification for surface finish, this must be agreed on by the designer and foundryman. Draft and gate projections also should be considered. The actual tolerances that can be supplied will vary in different foundries, and according to the class of work, but the following table gives typical figures.

Approx. Size of Sand Casting	As-Cast Tolerance	Additional Machining Allowance, Per Face
Up to 8 in.	$\pm\frac{1}{16}$ in.	$\frac{1}{8}$ in.
From 8 to 18 in.	$\pm\frac{1}{8}$ in.	$\frac{3}{16}$ in.
From 18 to 30 in.	$\pm\frac{3}{16}$ in.	$\frac{5}{16}$ in.
Above 30 in.	$\pm\frac{1}{4}$ in.	$\frac{3}{8}$-$\frac{1}{2}$ in.

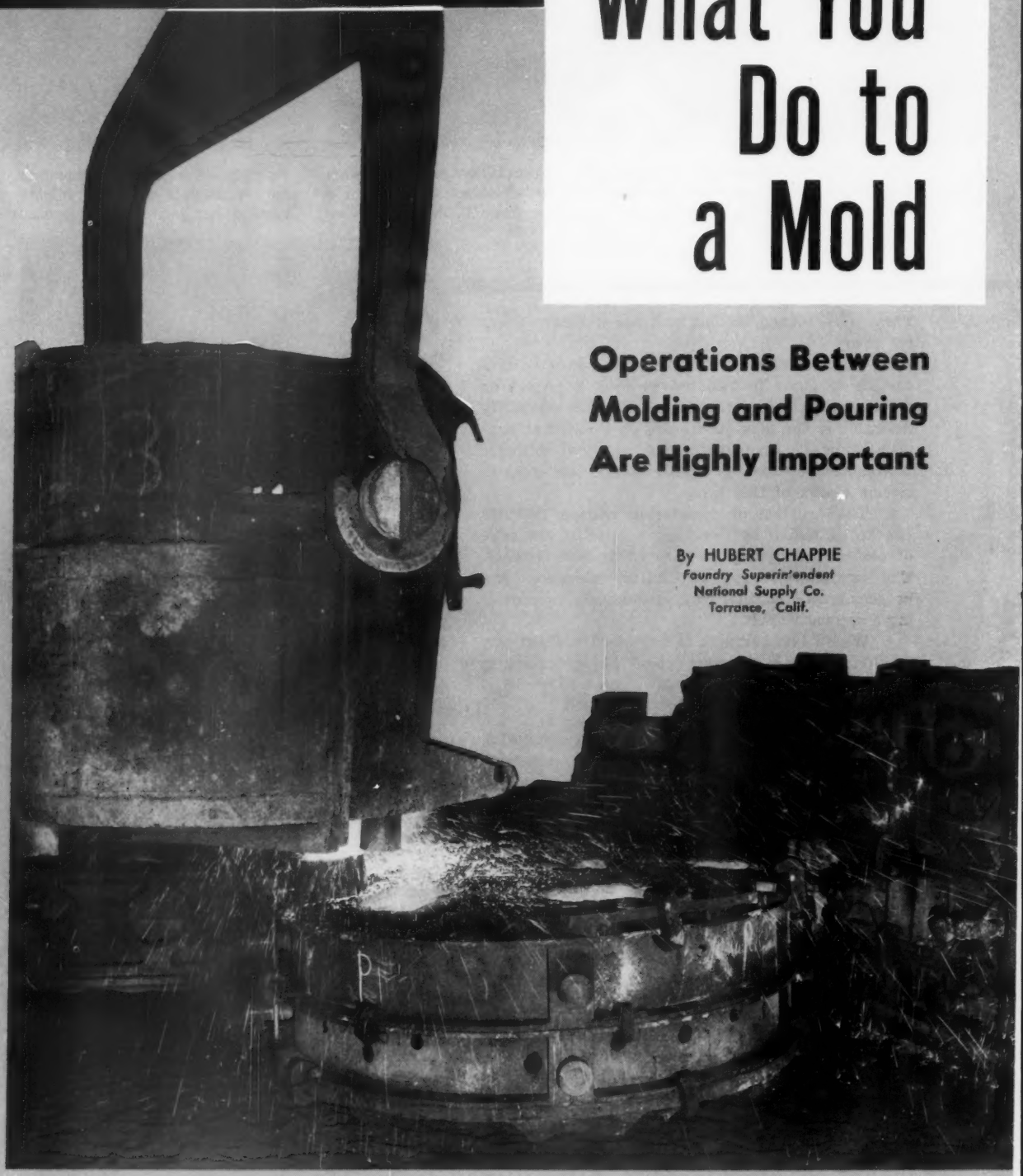
Closer tolerances can be obtained with rigid molds. Shell molds can yield tolerances of as low as 0.005 in. per in. The tolerances on investment casting molds are usually quoted as ±0.005 in. per in., but often are closer than this. Permanent-mold casting will yield similar tolerances though on simpler shapes. —*The End*

Cleaning Costs Are Affected by....

What You Do to a Mold

Operations Between Molding and Pouring Are Highly Important

By HUBERT CHAPPIE
Foundry Superintendent
National Supply Co.
Torrance, Calif.



In making large castings, the metal must be poured as quickly as possible and the metal temperature is controlled so that pouring is done at about 2750°F

IN the production of quality steel castings the value of a good sand formula can be offset by carelessness in processing the mold before it is poured. Actually, I would prefer a poor sand formula and correct procedures in drying, closing and pouring, rather than a good sand formula and poor practices after molding.

Removing the Cope—In the sequence of operations after the mold is made in a dry sand molding shop, the cope first is removed from the drag. In a miscellaneous, large floor shop it is important that, before hooking the chains to the trunnions, the chain be suspended above the flask and as close to its center as the judgment of the molder permits. After fastening chains or hooks to the trunnions, the craneman raises the cope and sets it on the floor, usually on its side, to permit washing. Obviously, if the cope is not drawn properly it may be torn and require patching. Improper patching of the cope can cause a crush when the drag and cope later are assembled, resulting in a sandy casting when poured.

Speaking of a sandy casting, may I go on record that at our foundry we never have a "dirty" casting. Our entire organization refrains from using this vulgar word; we speak of castings as sandy, but never "dirty." Among the reasons for this thinking is that we use sand—never dirt—as a molding medium.

Drawing the Pattern—After the cope has been removed the pattern is drawn from the drag. This would seem to be a simple procedure but it must be done correctly to avoid tearing up the mold. Small patterns usually have draw plates in which the molder may insert a draw tool. Large patterns usually are provided with draw straps having a hole in them near the top where a hook can be inserted and the pattern pulled either manually or by crane.

It is important that large patterns be built securely to withstand the excessive tugging necessary to remove them from the sand. In this connection it is vital that the pattern have the necessary draft to expedite its drawing from the sand. We usually request ⅛-in. draft per foot. In case the job demands no draft, either a loose piece or an extra core must be used.

The pattern now has been removed. At this time the mold should be inspected for soft spots. Occasionally the molding foreman should check the mold for hardness of ramming. Our large molds check between 80 and 90 hardness. This periodical checking can help to induce the molder to make a mold of uniform hardness and to convince him that you are interested in his work and are asking for quality molding.

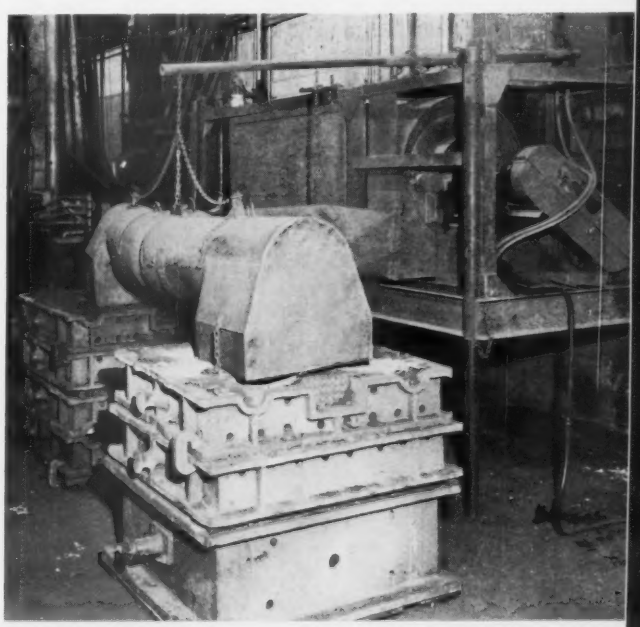
Cutting the Gate—The next operation in miscellaneous molding would be to cut a gate. A smooth job with well rounded edges is a requisite; a sharp gate allows the flowing metal to cut the sand. Of course, when ramming a mold it is important to place facing sand to the proper depth to allow for cutting a gate. The gate always should be made of the best sand, certainly not backing sand.

The type of gating used can have a tremendous effect on cleaning costs. Wherever possible, gating should include more than one ingate. Two are better than one and three or four would lead to further advantages. Scabbing and mold erosion are much more apt to occur with one lead gate than with multiple gating. Also, multiple gating reduces the force of the metal entering the mold and allows for more uniform heat distribution. If a miscellaneous job is repetitive it would be advantageous to have a set gate with the pattern. A rammed gate naturally is preferred over a cut gate.

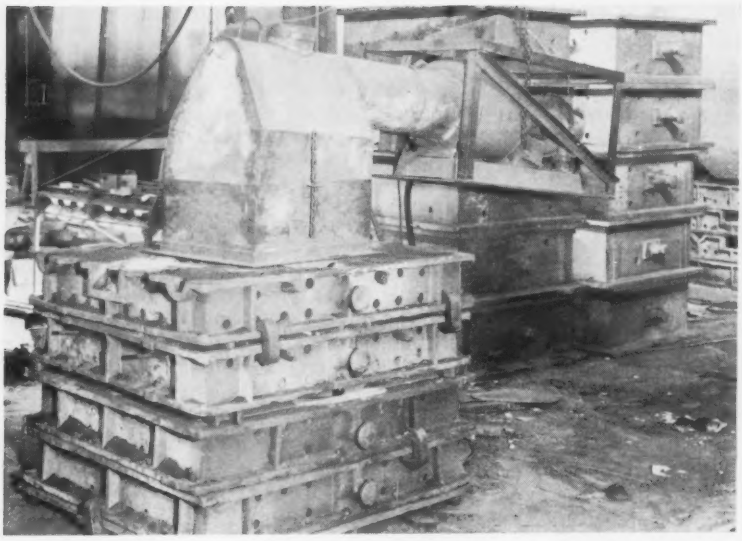
Gate size is critical when pouring large castings. The gate must be able to take the metal from the down gate, which is made according to the nozzle size. The faster a mold is poured, the less eroding action will take place, and the cope will not have to resist the long period of heat before it is covered. Slow pouring causes scabbing, erosion, and drops from the cope.

To Nail or Not—Whether to nail gates, fillet areas, and the area nearest the gate is something that must be evaluated by the individual foundry. In producing small squeezer castings there would be no reason to use large-head roofing nails to prevent the sand from eroding or scabbing. Also, in pouring small molds, the time of pouring is so short that the mold surfaces are not subjected to the force and intense heat experienced by heavy castings.

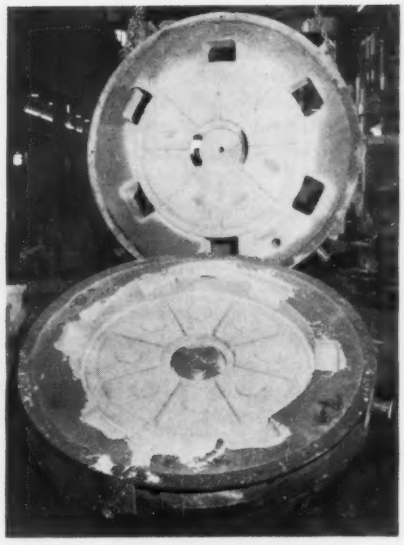
The subject of nailing areas in drags and copes is a controversial one. There is no doubt that nails are unnecessary if molds are properly made with the best sand formula, the right type of gating,



As there is no substitute for a well dried mold or core, molds dried under portable dryers are held at 500 or 600°F for a minimum of four hours



A portable gas-fired dryer in use on a cope and drag mold. Some large molds are dried two days



Completely dry cope and drag mold faces for 56-in. sheave ready for closing and clamping crew

correct drying and pouring, and without long holding time before pouring. In making large castings, however, the long time required to mold—perhaps several days—allows the sand to be exposed to the atmosphere, and the sand is not as immune to defects as in the case of small castings. Nailing provides more flexibility and insurance against sand defects in making large castings.

Where economy dictates, a riser pad for the heads should be used with loose patterns. This arrangement provides a place to attach fillets, lessening the possibility of cracks. Too often when the molder cuts fillets at the base of the heads, cracks appear. This trouble is due mostly to the erratic manner of cutting fillets.

The Right Baume—Now the mold is ready for the application of a wash. A good wash should be applied at the right Baume for your practices. Our molds are sprayed, using a 40 Baume, which we believe will penetrate the surface of the mold better than a higher Baume. Our experience shows that the higher the Baume, the thicker the wash, and when applied to a flat cope surface the thicker wash often flakes off while pouring. Flaking is more pronounced if a mold is poured rather slowly.

We have a barrel of wash in both the coreroom and the molding department. A mixer attached to each barrel operates continuously. The sand mill operators mix the wash and twice daily the sand tester checks it for Baume. If it is out of range he informs the muller operator, who makes the correction. The sand tester makes a written report daily of his Baume findings to the foundry superintendent's office. All the molders spray their own molds, and supervision checks periodically the application of wash to see that too much does not drip into pockets or that certain areas are not neglected.

If your company is a member of the Steel Founders' Society of America, you can refer to Research Report No. 18, "An Investigation of the Surface Finish of Steel Castings," which evaluates a number of good washes. Or you may want to make your own tests. Naturally a zircon wash will produce excellent results.

Mold Drying—Now let us consider mold drying. Our molds vary from medium size to large, the heaviest castings weighing 45,000 lb. Our mold drying equipment consists of a large gas-fired oven approximately 14 x 20 x 10 ft, several portable gas-fired dryers, and two batteries of infrared lights.

The average mold is dried in the large oven at 450° F for 10 hours. The molds dried under a portable oven are usually dried at 500 or 600° for four hours or longer, the time depending on type and size of molds. Large molds are usually dried overnight, sometimes for two days. For pit molds the portable ovens are much more satisfactory than the former practice of covering the molds with sheet steel and then placing a gas torch or two within the enclosure.

The infrared lights are excellent on smaller flasks, particularly flat drags and copes. These molds are placed on a conveyor and within 20 or 30 minutes are dried satisfactorily. Torch drying is used rarely, sometimes on a patched mold or core. This method is very unsatisfactory, in our opinion. Regardless of the type torch used, the operator will burn the mold edges occasionally. A few years ago when making breech rings we dried the molds with a torch and invariably we had some sand inclusions in the castings. We decided to dry these molds in the oven and immediately there was a decided improvement in the cleanliness of the castings.

The single property of sand which is said to be primarily responsible for defects and changes

in the property of sand is moisture. Most foundries run their moisture in green sand work from 2½ to 4 per cent, in dry sand work from 4 to 5 per cent. The exact amount depends on the type of sand and ingredients used. The quality of castings produced will be the answer. There is no doubt in my mind that underdrying of molds causes a great deal of the trouble and defects of castings. There is no substitute for a well dried mold or core. And those foundries which say they have neither the time nor space to dry their molds as long as they would like to must be satisfied with castings which will require more man-hours to clean.

Longer drying time is required as finer sands are used; also when the sand is loaded with silica flour.

In an article, "Steel Penetration," (FOUNDRY, April, 1955), Emmons and Bach state: "The fundamental cause of penetration is moisture in the sand. This has been known for some time; our results merely confirm it. The main (gaseous) penetration depends on the presence of carbon monoxide in the sand, and this in turn is a consequence of the presence of moisture in the sand."

In a subsequent article, "Steel Penetration—Some Further Observations," (FOUNDRY, October, 1956), Emmons, Bach and Jones point out that "there seems to remain only limited means of preventing or reducing penetration, namely, to dry the sand before a pour—and this is both difficult and undesirable—or to use a sand which is a silicate that will not open up by breaking down in a stream of hot water vapor."

Preparation for Pouring—After the molds have been dried, they are placed on the floor for core setting, closing, and clamping. Our foundry has two first-class molders, known as close-up men, who place all the cores in the mold and see that vents from the cores are sealed to prevent metal from entering them. We consider these men most important because they are able to catch mistakes made by the molders.

If the vents from the cores are not properly continued through the cope or to the sides of the flask, they may in turn cause blows and a defective casting. If a core can be placed wrong in the print, we ask the pattern shop to place a guide on the core so that it can be set only the correct way. Cores must be chapleted with the right metal thickness, and they must be secured in the drag so they will not raise. Cores must be wired in the cope to prevent them from moving out of position.

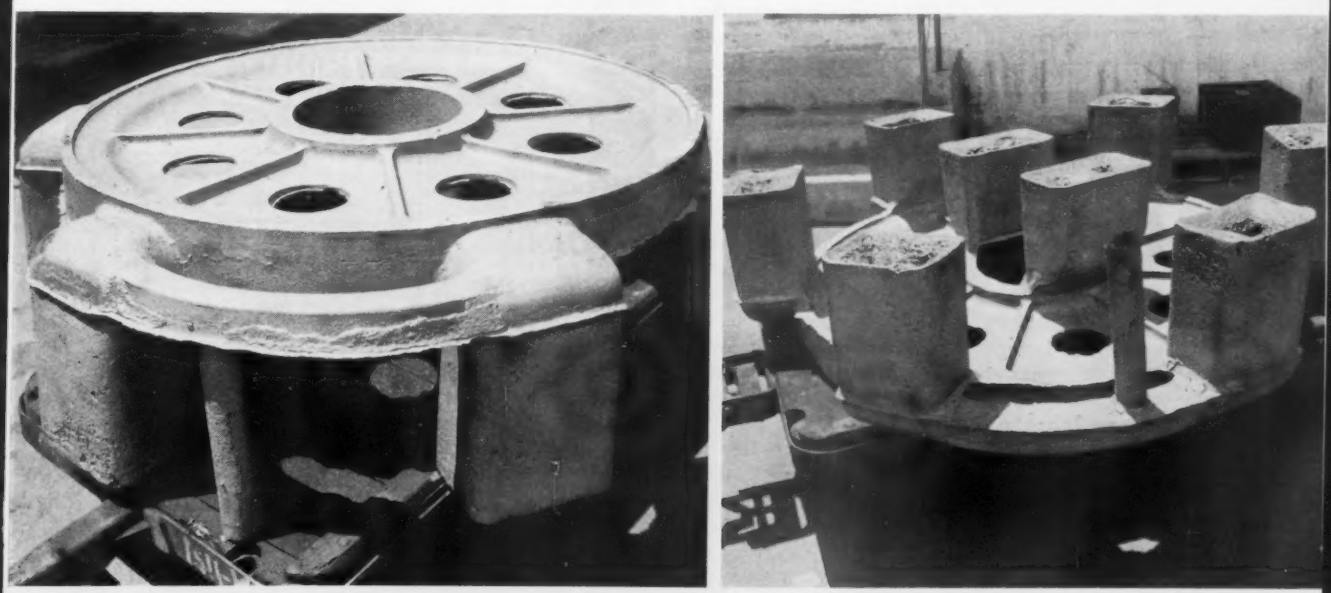
We use siphons to clean molds or, in many cases, we use a hose attached to a vacuum cleaner. When cores are fitted into coreprints, loose sand often is deposited in the mold; this sand must be removed before pouring to insure good clean castings.

It is important to have good flask equipment with hardened bushings and pins to prevent shifts.

Before closing large molds, some foundries use a sealer between the joints. Usually it is made of flour and oil; sometimes dry silica flour is used. This sealing prevents metal from running out between the flasks. After the molds are closed they must be clamped uniformly to prevent the mold from raising and causing distortion of the casting.

Now we are ready to place the cup core or pouring cup over the gate. This pouring cup must be of good sand and dried thoroughly to prevent erosion by the metal. Cups should be examined

Drag (left) and cope of 56 in. sheave casting shown with gates and heads still intact. It weighed 2440 lb as cast



occasionally after pouring, to see if they have become eroded. If so, a correction in sand or drying may be in order.

Faulty Pouring Is Costly—The next step is pouring. Faulty pouring can ruin the casting even though all prior operations on the mold have been carefully controlled.

We feel that bottom pouring is the cleanest pouring practice. Nozzle sizes used are 1¼, 1½, 1¾, 2, 2½ and 3 in. Our heats from one furnace vary in size from 12,000 to 20,000 lb. We pour 6000-lb heats from our small furnace, and heat size of our largest furnace, which is used also for pouring ingots, ranges from 40,000 to 60,000 lb. We now have a ladle to pour 80,000 lb at one time; this total weight is made up from the charges of two furnaces.

All of our electric furnaces are basic type, which practice we feel can make the cleanest steel for ingots and castings. Also, we can reduce and control our phosphorus and sulphur to specifications.

We firmly believe that we should pour large castings as cold as possible without getting wrinkles or waves, and should pour rapidly. In some cases wrinkles do not harm the casting—especially if the surface is to be machined—although the casting will not have eye appeal. To some people eye appeal is important.

We tap our large casting heats at 2800° F. This temperature is checked with an immersion couple. From checking many heats we find that if we have a 2800-degree tapping temperature, our pouring temperature is 2750°. If we are pouring 20 to 25 carbon steel, we are only 90 degrees above the freezing temperature of steel.

In making large castings, the pouring temperature is extremely important in minimizing cracks and penetration. No single property will prevent sand penetration as much as pouring with cold metal.

With 60,000 and 80,000-lb heats we pour with two 3-in. nozzles. A 40,000-lb casting can be poured in 1 minute 25 seconds, or 4 to 5 seconds per ton. Sometimes we use two gates. At other times we open one nozzle, and when a pool of metal is in the mold the second nozzle is opened into a head. When we get up into the heads we stop pouring through the gate.

In pouring medium castings with a 16,000-lb heat it is important to pour uniformly into the cup. A new craneman or a new ladle pourer can cause castings to be wrinkled, scabbed and sandy. When a small stream of metal is entering the mold and the pouring is slow, if one is able to watch the metal coming up into the head he will see the cope spalling. An experienced craneman can make quick adjustments if he sees he is not over the center of the cup.

The amount of metal in the ladle also can affect the pouring time. Once we poured a 16,000-lb heat for ten castings (each 1200 lb, including heads) and four large test bars. We used a 2-in. nozzle, and the first few molds were poured in 8 seconds each. The last casting took 23 seconds.

How Long for Drying?—Here's what we did to settle differences of opinions about time of drying molds to produce the cleanest castings. The opinion was shared that castings would have better surfaces if, after being made, they were air dried over night before oven drying. For this test, it was decided to select a job that would be more apt to scab than an ordinary one. We selected a sheave job because it had a flat cope.

The sheave, shown in the accompanying illustration, was made of 40 carbon steel, with clean weight 1220 lb. With six heads on the rim and two on the hub, the casting weighed 2440 lb as cast. The gate was between two heads, and the mold was tipped 3 degrees gate down. Usually molds with flat copes are tipped approximately 8 to 10 degrees, but we did not want to increase height of head. Pouring uphill is a decided advantage in producing clean castings. When metal enters a mold poured flat, it flows over the entire drag and this heat causes spalling on the cope. If the metal enters on a tipped mold, however, the metal does not cover the entire drag immediately.

We made 17 sheaves in April, 1955, which we numbered consecutively 1 to 17. The molding foreman kept a time record of each operation after molding. This record included 1) the mold hardness of each drag and cope, 2) the time elapsed until first the drag was dried, then the cope, 3) the time the mold remained on the floor before it was closed and 4) the time it was closed before pouring.

TABLE I—Defects per Segment, Sq In.

CASTING NO.	DRAG SEGMENT NO. 1	2	3	4	5	6	7	8	COPE SEGMENT NO. 1	2	3	4	5	6	7	8	TOTAL
1							24				6		6				36
2		2		10			4			8			10		3		37
3								3									3
4		7			4	20	26		3	1	5			10	10	11	97
5			3					1	2	4		4					14
6	4	10	3	6		1		18		1	1		3				47
7	6		2					10		2							20
8		6						6		3	2		3		3	12	35
9		15	6	1					3		5	1	3	8	2	7	51
10	8	4					1	44	8	16	11	11					103
11	4	4							4			1		2		14	31
12	2	3		1		2				5	1	5			1	6	26
13							4			1	3					8	16
14	1	12					4	20	6	9	14	8		2		2	78
15		14					3	10	6	12	10	2			2	5	64
16		9							4	2	4	4			2	4	29
17		1														1	2
	25	87	14	18	4	23	66	112	36	64	62	36	25	22	23	70	

TOTAL DRAG—349 SQ IN. TOTAL COPE—338 SQ IN.

TOTAL—687 SQ IN.

DEFECTS—SCABS, DROP AND SANDY SCABS 98% OF TOTAL

TABLE II—Time Record of Drying Molds

CSTG. NO.	ELAPSED TIME BEFORE DRYING DRAG	COPE	TIME ON FLOOR	CLOSED	HARDNESS	TEMP.
1	7.50 HR	5.85 HR	0.90 HR	0.42 HR	80	2850°
2	27.50	24.5	9.33	0.25	85	2850°
3	4.50	3.25	9.33	0.25	80	2900°
4	29.50	23.90	6.25	0.67	80	2900°
5	8.50	6.25	6.25	0.67	85	2840°
6	10.00	8.33	14.0	1.00	80	2840°
7	4.50	2.50	14.15	0.83	80	2890°
8	70.00	67.50	5.5	0.25	80	2890°
9	64.25	62.50	6.0	0.25	85	2890°
10	22.50	21.00	7.0	0.50	85	2900°
11	6.00	3.50	13.0	0.50	85	2900°
12	22.50	21.00	9.0	1.33	80	2900°
13	6.00	3.50	9.0	1.33	85	2910°
14	10.5	9.00	9.0	0.50	85	2920°
15	5.5	4.5	9.0	0.50	85	2880°
16	10.5	9.0	12.25	0.75	85	2880°
17	5.0	4.0	12.50	0.50	80	2910°

NOS. 1, 2 AND 3 DRIED IN OVEN AT 400°—14 HR, BALANCE WITH PORTABLE DRYER AT 500°—4 HR

None of these sheaves was closed more than 1 hour and 20 minutes before pouring. We consider any mold poured 2 hours after closing as an unfavorable action; we know from experience that the longer a mold is closed before pouring the more the sand deteriorates from a dried condition and has an adverse effect on the castings.

The pouring temperature of each heat and humidity and temperature in the daytime and at midnight also were recorded. Temperature and humidity were so uniform that we decided it had no effect on the casting, but in some sections the weather certainly can affect mold conditions.

After the casting was poured, it was shot blasted with heads and gate attached. Each of the eight segments of the sheave was given a number, starting with the one between the gate as No. 1 and proceeding clockwise. Each segment was evaluated for defects by the same person for the entire drag and cope.

Only by analyzing castings and their defects with gate and heads attached can one ascertain the nature of the defects. Usually it is a breakdown of the gate which is visible when the gate is attached.

Table I illustrates the amount of defects, in square inches, in each segment of drag and cope. Table II shows 1) how soon after the mold was made the drag and cope were dried, 2) how long the mold remained on the floor before closing, 3) how long it remained closed before pouring, 4) average hardness of each mold, and 5) pouring temperature asked for at the furnace.

Table III includes three rows of numbers. The first row lists the 17 castings by number from left to right in increasing order of their defective areas. The second row indicates how these castings ranked in amount of welding time required, starting with the least time at left. The third row of numbers shows the ranking of air dry time before fire was applied to the mold, with the least time at left.

Table IV lists the total defective area of each of the segments for the 17 castings. Segments 2 and 8, which are closest to the gate, had the greatest amount of defects. This condition is natural because the metal passes over this area the entire time of pouring. The segments with the least defects are farthest from the gate where the metal is coldest.

Of the 17 molds observed, the 8 molds dried within 10 hours, with the exception of No. 15, followed a pattern—they produced the best castings. We cannot account for No. 15 not following the pattern. One can assume there is a reason which we did not detect.

We can also conclude that molds dried after 10 hours or more show no difference in quality. It is clear, however, that molds dried after this period cannot be compared with the early drying in producing quality castings.

The data show that the molds, after being closed, did not stand more than 1.33 hours before pouring. This is a most favorable time limit; we feel that standing for more than 2 hours does affect the quality of the castings.

We conducted a similar project on 30 sheaves a year later with the same convincing results.

This type of project in the interest of improving quality, with the participation of supervision, is invaluable in impressing supervision with the importance of proper methods in the production of quality castings. A few precautions prevent a lot of expense. *—The End*

TABLE III—Ranking of the 17 Sheave Castings

◀ LEAST —— DEFECTS —— MOST ▶																
17	3	5	13	7	12	16	11	8	1	2	6	9	15	14	4	10
WELDING TIME																
17	3	5	11	1	13	6	2	7	15	8	14	9	16	12	4	10
AIR DRY TIME																
3	7	17	15	11	13	1	5	6	14	16	12	10	2	4	9	8

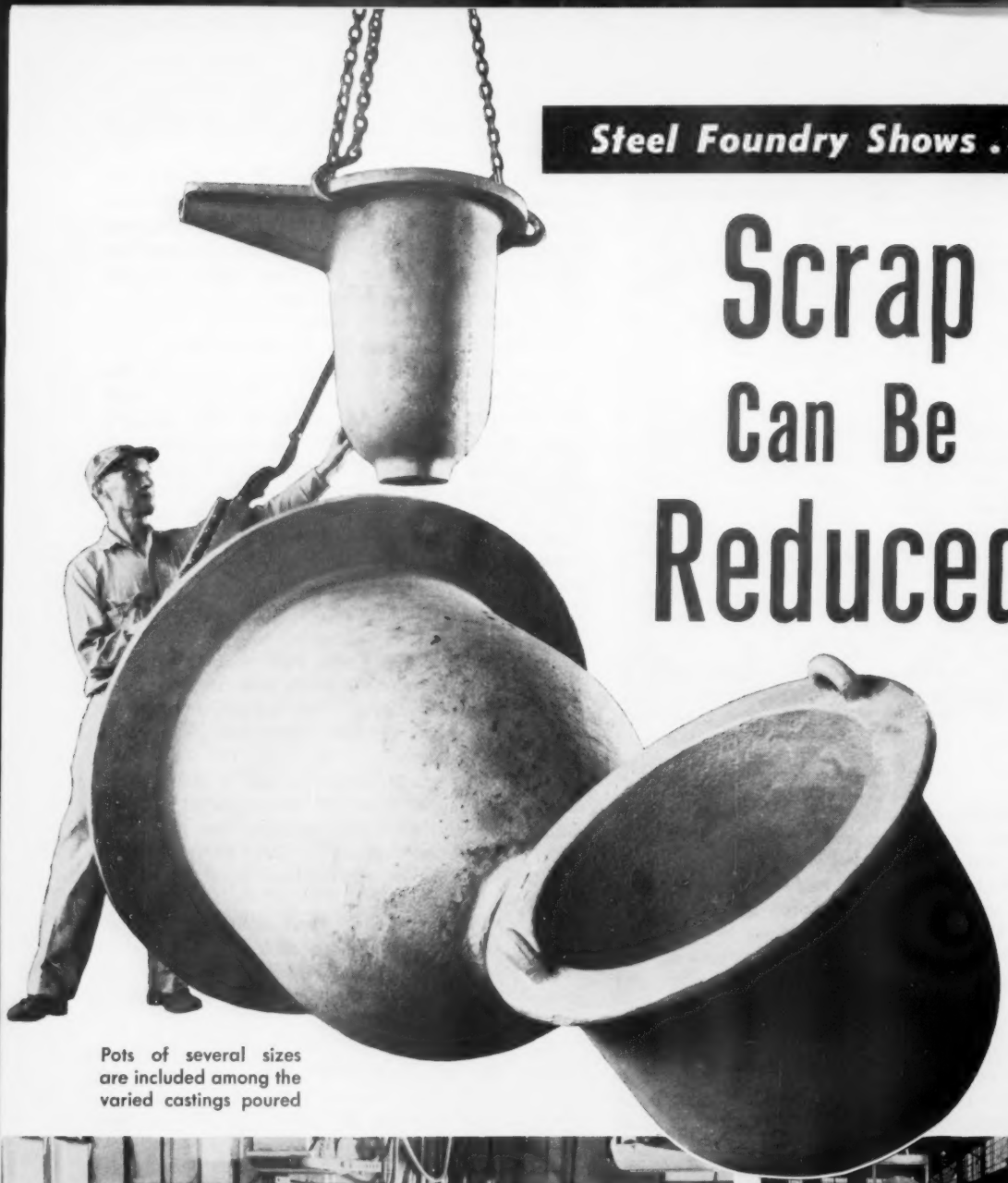
TABLE IV—Defects in Sq. In., both Cope and Drag

SEGMENT NO.	DEFECTIVE AREA
1	61 SQ IN.
2	151
3	76
4	54
5	29
6	45
7	89
8	182
TOTAL	687 SQ IN.

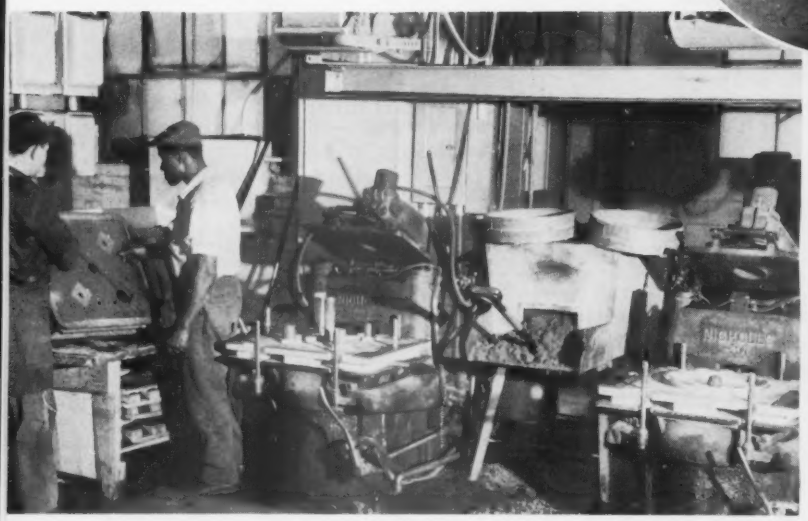
NO. 2 AND NO. 8 SEGMENTS CLOSEST TO GATE

Steel Foundry Shows . . .

Scrap Can Be Reduced



Pots of several sizes are included among the varied castings poured



Operators work as a team to set cores and nails in a cope made on one of the pin-lift machines

View of floor molding operations. Radiant electric heaters are used for skin drying of molds

Here is a foundry that has earned an enviable low-scrap record with good management planning, practical use of historical data and co-operation from department heads and production workers

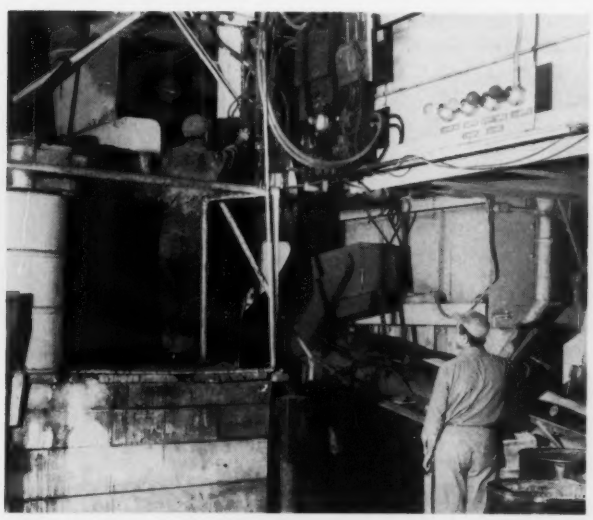
By ROBERT H. HERRMANN
Associate Editor

PRIDE in workmanship and conscientious effort on the part of production workers and management have lowered production scrap to not over 1.68 per cent in the last five years at Swedish Crucible Steel Co., Detroit.

During the same period, returns from customers have averaged under 1 per cent. High operational efficiency is shown also by a yield approaching 80 per cent on a number of jobs. Yield on some of the more intricate castings naturally is not so high, going down to 45 per cent in some instances.

Careful planning, co-operation between the heads of foundry departments and the practical use of historical records form the background of this quality picture. When a new pattern comes into the shop the foundry superintendent and foremen from the patternmaking, molding and cleaning departments meet to discuss gating requirements and suggest possible design changes to facilitate production in their departments. All must approve the finished pattern before it goes into production.

Accurate records are kept on gating, flask size, core and molding sand formulations, metal analyses, cleaning room techniques, and difficulties encountered, if any, on every job produced in the foundry. Records are kept up to date through systematic follow-up of each job as corrections are made during production. A modern and complete chemical and metallurgical laboratory is maintained for regular, routine tests of incoming materials and materials in process. Magnetic particle inspection is employed regularly as part of the quality control program. Radiographic inspection also is available for use when necessary.



Belt conveyor gathers sand and additives while water is metered into the molding sand muller

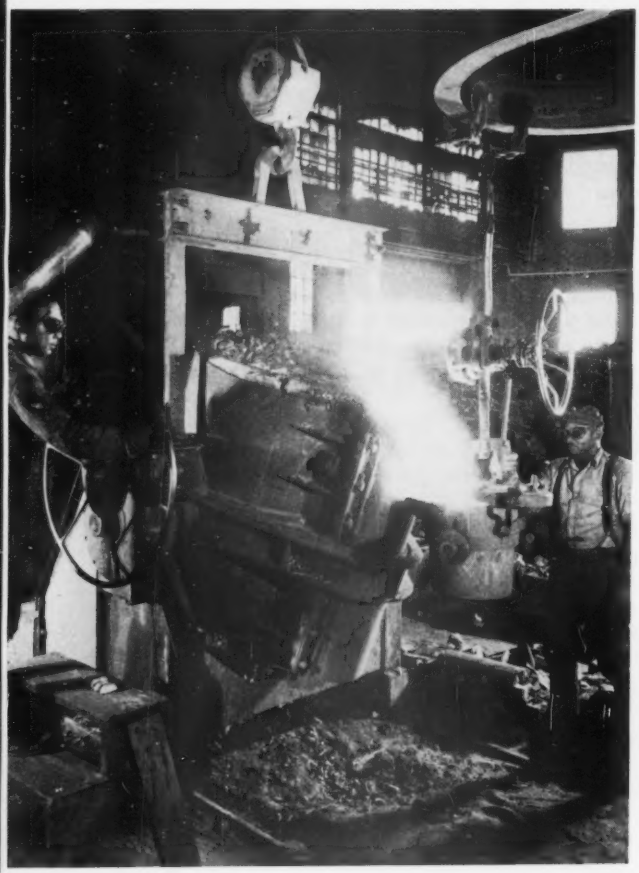
The foundry is engaged in jobbing work as well as regularly scheduled production runs. Other production includes press and hammer parts, highly stressed machinery castings, dies, gears, sprockets, runways, jig and fixture castings, tank parts and melting pots. Castings range in size from ½ lb to 7 tons. About 75 per cent of the castings are poured in carbon steel, the balance in alloy steel. Foundry capacity is 750 tons a month with 225 production workers.

Divided Production Flow—The foundry area is L-shaped. Rail cars on a spur track bring purchased steel scrap into the building at the end of one of the legs. A bridge crane unloads the cars and piles the scrap. It also fills charging buckets and carries them to the furnaces. Charges generally are divided evenly between home and purchased scrap.

Adjacent to the storage area are two 1½-ton electric arc tilting furnaces. One is a top charger and the other a side charged unit. Metal is tapped into bull ladles, moved by the crane to cradles where they can be hand-tipped to fill the small mold-pouring ladles. Exhaust hoods over each furnace remove fumes and smoke.

Balance of this leg of the L contains a line of molding machines along one wall. Floor and pit molding are conducted in the center area. The coreroom and sand preparation areas occupy space along the other wall. An aisle down the center of the other leg divides the area into casting cleaning facilities for small castings on one side with heat treating furnaces at the end and large casting cleaning equipment on the other side. Inspection and shipping activities are at the end opposite the heat treating furnaces.

Machine Molding—The line of machines includes eight squeezers and two pin-lift machines which are operated as a pair. These ten machines use aluminum snap flasks. Another pair of pin-lift machines and a third pin lift and a strip-draw rollover machine, also operated as a pair, produce larger molds in steel flasks. Drags from the strip-draw rollover are rolled out to a roller conveyor turntable placed about 18 in. off the floor. A hoist lifts copes from the pinlift machine and closes the mold on the turntable. The completed mold is rolled from the turntable to a roller conveyor transfer car which rides on a floor track across the ends of eight roller conveyors. Molds



A bridge crane sets bull ladles on a cradle for filling pouring ladles which roll on a monorail

can be rolled off the car to any of these conveyors for pouring.

Eight more pouring conveyors and a transfer car handle molds made in steel flasks on the pair of pin-lift machines. Molds on these 16 conveyors are poured from ladles suspended from an overhead monorail. Cooled molds from these conveyors are rolled off to transfer cars on a second set of floor rails for movement to a hooded chute. Here an electric hoist equipped with a bail and mounted on a short overhead monorail section lifts flasks from the car and dumps sand and castings into the chute, leading to a below-floor-level, inclined oscillating conveyor. Its contents are deposited on a floor level shakeout across the molding bay.

Snap flask molds made on the other pair of pin-lift and eight squeezer machines are set off on wooden bottom boards on a series of gravity roller conveyors. Aluminum jackets are placed on most molds before pouring. Manually operated, monorail-suspended ladles are used, and cooled molds are hand dumped off the ends of the conveyors to a 120-ft-long oscillating conveyor hooded and exhausted to the atmosphere. This conveyor feeds into the oscillating cross conveyor described previously.

Floor Molding—Floor and pit work are done on the other side of the 120-ft-long oscillating mold dump conveyor. Most molds are produced with a motive sandslinger. Skin drying of those molds requiring it is done with electric resistance rod radiant heaters. A 15-ton bridge crane is used for closing molds and handling bottom-pour ladles. It also transports poured molds over the oscillating cross conveyor to a cooling floor opposite the cleaning room bay, and returns flasks to the molding floor.

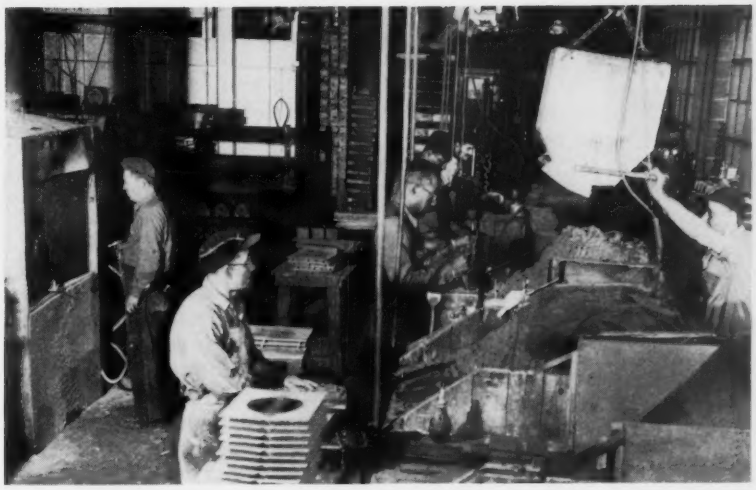
Castings in the cooling area are broken out by hand, and gates and risers are cut off with an oxyacetylene torch. The bridge crane lifts these large castings onto a rail car and a capstan pulls it into a walk-in blast cleaning room. A magnet attached to this crane removes small castings from the shakeout. They are swung to a pile in front of a tumble-blast unit and are hand-hooked into the skip hoist used to charge the cleaning unit.

Sand Handling—The green sand preparation center is located next to the shakeout. Used sand falls through the shakeout grid down a chute to a barrel screen. A belt below the screen feeds sand to a bucket elevator. It dumps sand onto a belt which carries it over a magnetic pulley and into a 350-ton capacity bin. New washed and dried silica sand is delivered to the foundry in drop-bottom cars which empty into a ground-level chute covered by a grid. The chute feeds a bucket elevator which empties to a belt over a 90-ton core sand bin plus two 90-ton and one 850-ton molding sand bins. Hand-operated plows remove sand to the appropriate bins.

Molding sand is prepared in a 2000-lb capacity muller operated on a cycle of about a minute. Air-cylinder-operated gates at the bottoms of the four molding sand storage bins are controlled through push-buttons from the operator's station to make up sand formulations. Used sand flows from its bin directly into a skip hoist marked at various levels to measure a predetermined amount of sand. New sand falls from its bins to a belt which empties into a chute carrying the used sand. Dry additives are hand-measured onto this belt at a point just before it empties into the chute. Water additions are made automatically in amounts determined by a moisture measuring device which has probes in the chute feeding the skip hoist.

Prepared sand is discharged to a below-floor-level belt and carried across the foundry to the wall along which the molding machines are located. A bucket elevator raises the sand to a reversible belt over the molders' hoppers. A man on a catwalk adjusts plows to keep hoppers filled. Reversibility of the distribution belt is necessary because hoppers are located to each side of the point where sand is received from the bucket elevator.

Sand flows off the end of this belt nearest the large mold cooling area into a portable hopper for the sandslinger. It rests on a small rail car which is pulled by the floor molding area bridge crane from under the sand belt to the large mold



Cores are made on benches and on three blowers. Sand is delivered in a monorail-carried bucket

Spherical cores shown in the foreground will be used for producing a ball socket joint casting

cooling area. A cable attached to the car is run through a pulley on the floor. A ring on the other end of the cable is engaged by the crane hook, and, as the crane lifts, the car is pulled into position. The crane then lifts the hopper from the car and places it on the sandslinger and carries an empty hopper back to the car.

Samples are taken from every batch of prepared sand and tested in the laboratory. Four basic molding sand mixes are made: Backing sand for general use, facing sand for the machines, floor facing and a mix for the sandslinger.

Coremaking—Core sand mixes are mulled in 400-lb batches. Sand is released from the 90-ton storage bin by hand-operated gate to a small bottom-gated bucket on a low-wheeled cart. The cart is pulled into place under an electric, self-propelled hoist suspended from an overhead monorail. The hoist lifts the bucket and moves it over the muller for discharge of the sand. A similar bucket receives prepared sand and is transported by the monorail hoist over coremakers' benches and hoppers for core machines.

Ten different mixes are used to satisfy requirements of various types and sizes of cores. Water and oil are metered into the muller and dry additives are measured by hand.

Cores are made at six bench stations and on three coreblowers. Some cores are sprayed with a wash in a vented enclosure prior to baking. Coremakers set green cores on asbestos-cement boards and load the boards to metal racks which are moved by fork trucks to either of two gas-fired batch ovens. The doors of these ovens face the adjacent floor molding area so that large molds which are to be dried can be rolled in and out of

Acetylene torch operators sit on swivel stools in center openings of circular tables to remove gating metal from castings. Helpers load and unload tables

Portable grinder is used for touch-up cleaning on this large casting before it is heat treated

the ovens on rail cars propelled by cable and capstan.

Following definning and pasting operations, cores are loaded onto pallets for delivery to the molding floor by fork truck.

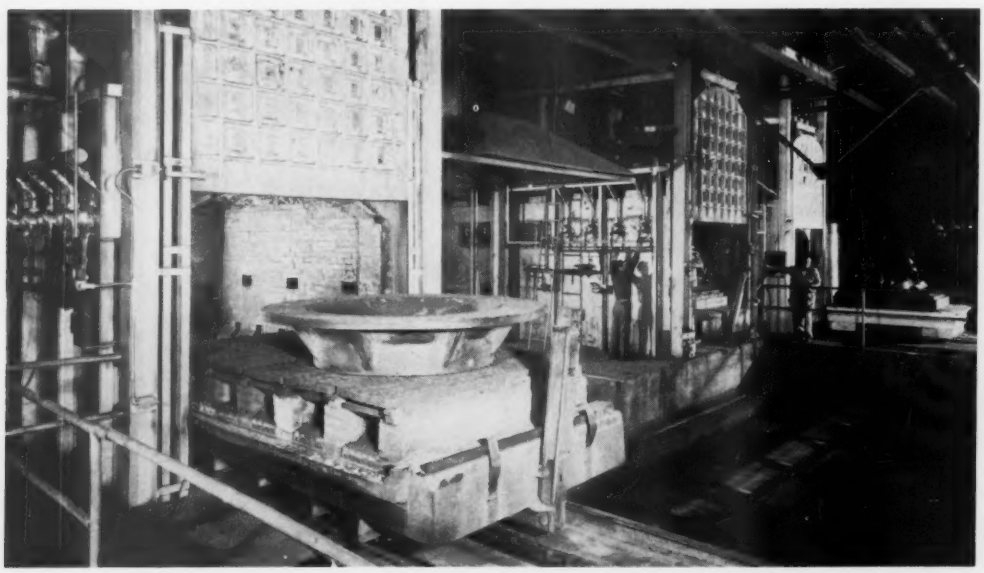
Cleaning Small Castings—Small castings are cleaned first in a tumble-blast machine and are discharged to 24 x 30 x 15-in. deep tote boxes carried on a waist-high gravity roller conveyor. Running almost the whole length of the cleaning room bay, this conveyor incorporates several swivel sections which permit the tote boxes to be rolled off to conveyor spurs for processing operations. Power shears remove gating metal from some castings. Acetylene torches also are used. Torch operators perform their work along rectangular tables or from a center opening in circular tables. In either case a helper loads and unloads the tables so that torch operators lose little time from cutting. The operator inside the circular table sits on a swivel stool and literally turns to his work.

An automatic, traveling acetylene torch removes gating metal from those castings adapted to the process. Castings are clamped along a way about 8 ft long on which the torch and its electric carrier run. Gating metal from the row of castings is cut off in one pass.

Spurs farther along the main gravity roller conveyor lead to one double and four single stand grinders. Beyond these is a semicircular spur on one side of the main conveyor. A swing grinder

Left—Small castings are weighed and inspected visually, then put on trays to be heat treated

Below—Endless chains engage dogs on cars to pull them in and out of heat treating furnaces



is positioned outside this semicircle. Touch-up work on swing ground castings is done by a man at a bench inside the area formed by the semicircular spur.

The visual inspection and weighing area for small castings is located on the other side of the main conveyor opposite the semicircular spur. Castings are weighed out to a large tray on a flat-top car. When loaded, the car is moved by industrial truck across the floor to the cleaning area for large castings. At this point the tray of castings is picked up by a 5-ton, electrically propelled bridge crane, transported to the heat treating area and loaded onto one of the oven cars.

Castings requiring welding or additional cleaning are pushed past the inspection and weighing area on the roller conveyor to booths equipped with portable grinders and welding equipment. When work is completed on the castings, they are moved back to the inspection area for weighing. All grinding and welding stations in the area are equipped with exhaust systems.

Cleaning Large Castings—Large castings first are loaded on cars for cleaning in a blast chamber. Cars then are moved through doors at the back of the chamber so that a 5-ton bridge crane can lift castings to curtained and exhausted swing grinding booths and to chipping and welding stations. These stations are equipped with adjustable, flexible-pipe exhaust systems.

After cleaning, those castings which are not to be heat treated are inspected, weighed and loaded to trucks for shipment. Those to be heat treated are loaded onto furnace cars by the 5-ton bridge crane.

Gating metal from the cleaning room is tossed into skid boxes and transported by electrically powered walkie trucks to the floor molding area where the boxes are picked up by bridge crane and moved to the inside storage area in the melting department.

Heat Treating—Three furnaces are available for heat treating. Cars are pulled in and out of the furnaces by electric-motor-driven endless chains which engage dogs on the bottoms of the cars. A transfer track section located in a pit in front of the 10-ton and 15-ton furnaces permits moving the cars in and out of both furnaces and the cooling hood between them. The transfer unit is moved back and forth in front of the two furnaces and cooling hood by an electrically driven endless chain at bottom of the pit.

The third furnace is serviced by a straight-in track and is used primarily for alloy steel castings.

All furnaces are fired with gas and equipped with electronic controls for maintaining the desired temperature within $\pm 5°F$.

Final Inspection—A team of inspectors operates in the area opposite the heat treating furnaces. Castings are inspected 100 per cent or on a sampling basis, depending on customer requirements. Inspectors have complete specifications and a drawing for each casting. Weights are checked, dimensions measured and appearance checked against the drawings. Jigs and templates are used and hardness readings are taken. Magnetic particle inspection equipment also is used.

Housekeeping and Ventilation—A program of continual sweeping and picking up in all sections of the foundry maintains uncluttered, safe working areas. Windows are washed regularly. The resulting increase in daylight plus supplementary electrical lighting also contribute to the safe and efficient operation. In addition to localized exhaust systems at areas of high air contamination, a modern air cleaning system removes contaminants from the general foundry atmosphere.

As part of company's close inspection procedure this worker checks casting with go, no-go gage

Chemical and metallurgical tests are performed routinely in this modern, complete laboratory

Coremaking Practices in the

Brass Foundry

Production of good cores at a reasonable cost is the subject of article No. 21 in Mr. St. John's series on *The Brass Foundry*

By HARRY ST. JOHN
Foundry Consultant

NO SERIES of articles on brass foundry practice can be considered complete unless it includes a discussion of coremaking practices. Good cores are essential to good castings, but that statement—true as it is—does not go to the heart of the problem, which is cost. Possibly no other foundry operation involves so much likelihood of spending money extravagantly.

Today, new coremaking methods, designed to reduce costs, are so numerous and in such a state of transition that any article written now is likely to be obsolete within 5 years. It follows, of course, that the brass foundryman must plan to modernize his coreroom at an early date, but he must also be cautious in adopting any new method until he can see clearly what will be best for his particular foundry. If he invests substantially now in new equipment, even though he knows it will save enough money to justify its cost, he may presently learn that he could have made even greater savings at a smaller investment.

Conventional Methods—Let us consider first the conventional methods now in common use and see how they may be perfected to tide us over until we are ready to make basic changes. No matter what the process of its manufacture, a good core will hold its shape until metal has solidified around it. It will then collapse so completely that its substance can easily be removed through the cored openings in the casting.

It will resist penetration of metal into its surface and will not cause metal fins by cracking open when the metal strikes it. The evolution of gas from the core will be as small as possible and such gas as there is will be vented to avoid core blows and gas porosity in the casting. The shape and dimensional accuracy of the core will be as nearly perfect as is required by the casting in question.

In the past, the brass foundryman's favorite core binder has been linseed oil. Linseed oil provides good green strength with a minimum evolution of gas at the time the casting is poured. But linseed oil has become increasingly costly and its use as the sole binder is now limited to cores in which minimum gas evolution is of prime importance. So-called linseed-base oils are prepared by blending a great variety of other substances with the linseed oil in order to obtain a cheaper binder without too much sacrifice of quality. Some of the substances used are mineral oils, fish oils, resins, rosin oils, casein, cereal flours, fire clay and bentonite.

Some of these additions have advantages not entirely limited to a cheapening of the binder. Increased green strength is sometimes a factor, as is a shortening of the baking time. In some cases improved collapsibility is the goal. Almost without exception, the blended oils present more of a gas problem than does the straight linseed. Some core-oil constituents—the fish oils for example—pose a special problem due to their disagreeable odor so that labor relations become an important factor.

Baking Operation Critical—Whether linseed oil or a linseed-base oil is used, baking times and temperatures are critical. An underbaked core will yield an excess of gas when the molten metal strikes it. An overbaked core lacks strength; sharp edges and delicate parts are likely to crumble. Linseed oil and other drying oils harden by oxidation during the baking cycle. The presence of air is necessary and there must be a correct correlation of time and temperature, which will vary with the thickness of the core. Generally speaking, a straight linseed core attains maximum strength in 1 hour at a temperature of 450° F, in 1½ hours at 400° F. At higher temperatures the size of core and exact timing become more critical.

An entirely different type of binder has more recently become prominent. Oils or resins which polymerize are tranformed by heat into more complex compounds, which harden and form a strong binder without the need for time-consuming oxidation. Some of these binders are natural petroleum products, other are man-made synthetic

Well lighted coreroom is equipped to produce cores on a coreblower and on several benches

resins. They are more costly than the common core oils but have the advantage that they are less sensitive to over baking. This factor becomes important when cores of different thicknesses are baked at the same time.

The variety of core mixes in common use is so great as to make impractical an exhaustive description of them here. For more complete information the reader is referred to the latest edition of *Foundry Core Practice* by Harry W. Dietert, published by the American Foundrymen's Society. One point needs emphasis. The brasses and bronzes are particularly subject to gas porosity. For this reason the proportion of core binder must be kept as low as possible. One can seldom tolerate less than 50 parts of sand (by volume) to one part of binder and often 70 or 80 to one will give better results, even though this means a very weak green core.

Round sand grains make for higher permeability, which usually means a natural bank sand containing a little clay. A three- or four-screen sand of AFS fineness 100 to 125 is desirable. To obtain a higher green strength without adding too much binder a proportion of sharp sand will help. In exceptional cases, a core almost entirely surrounded by metal may have to be made of 100 per cent sharp sand, in which case the cored surface of the casting will be very rough.

Mulling is Preferred—Core sand mixtures are best made in a muller type mixer where the kneading action is calculated to coat each sand grain with oil without leaving an excess of oil between grains. If water is to be added, it should be done after the oil is thoroughly mixed. The time required for mixing will vary from a couple of minutes in some muller types to as much as ten minutes in others.

It is frequently necessary to reinforce cores with rods or wires to provide sufficient strength. They should be dipped in oil so that the sand will adhere to them. So far as possible they should have no exposed surface which will come into contact with molten metal.

Unfortunately, cores cannot always be made in one piece and an assembly operation after baking then becomes necessary. It is accomplished by means of paste which must be thoroughly dried before the core can safely be used. Otherwise there will be blowholes in the cored structure of the casting, commonly in a vital spot. Air-drying pastes now are available which are quite satisfactory. With other pastes drying for a couple of hours in a steam oven is needed. Extensive patching of damaged cores is inadvisable but minor repairs can be made using an assembly paste. Extreme care must be practiced in assembling cores to make sure that all parts are in correct alignment. For production work a considerable number of fixtures may be necessary at a cost which can be quite substantial.

For intricate or delicate cored cavities a smooth surface, free from burn in, is important. This surface can be obtained by the use of a core wash. Despite its added cost it may result in a net saving due to a reduction in cleaning costs. Core washes exist in great variety, some using a water mixture, others an organic vehicle such as carbon tetrachloride, alcohol or naphtha. Solid substances used may be finely powdered graphite, talc, silica flour, colloidal aluminum oxide or clay.

An excellent but rather expensive wash consists of talc suspended in a solution of rubber cement or synthetic resin. Large cores are commonly painted or sprayed, while dipping is most economical for small cores. Constant mechanical mixing of the suspension is advisable. No matter what wash is used, cores must be thoroughly dry before setting in the mold.

Cores which are stored for days or weeks before use may pick up moisture from the air and, if so, will cause casting trouble. The storage space should be warm and dry. After long storage cores should be checked before use. For the same reason, leaving cores in an unpoured mold over night is questionable practice and leaving them over a

Cores are shown being placed in a continuous, vertical baking oven from a loading station at the end of the conveyor

weekend is certain to be a cause of trouble.

Production Methods—Large cores are necessarily made by hand, medium-size cores often on rollover machines. Small cores, if very intricate or if only a small number are required, may also need to be made by hand. If a large number of medium or small cores are to be made, however, core blowers should be employed. Small bench blowers are relatively inexpensive. Large blowers are more costly but more suitable for high-speed production. Commonly several cores can be made at a single blow in a gang box. The production of one such blower is roughly equivalent to that of three and one-half bench makers working by hand.

Two things are of vital importance in core-blowing practice. First of all, the core mix must flow readily into all the nooks and corners of the box. Some mixes which may be preferable for hand work cannot be used at all in blowers because they are not sufficiently flowable. Cores which require such mixes must be made by hand.

Of equal importance is the venting of the box. When cores are made by hand the escape of air from the corebox cavity is no problem, but when a core is blown the cavity is filled almost instantaneously and provision must be made to get the air out just as quickly. This is accomplished by means of vents built into the box, partially closed by grids so fine as to prevent the passage of sand along with the air. Vents are strategically placed so that there will be no trapped air pockets to interfere with solid filling of the cavity at all points. Soft cores sometimes result from insufficient air pressure. For brass work, line pressure at the machine should be 100 to 105 psi.

As already mentioned, cores of the linseed oil type require a baking time of 1 to 1½ hours at 400 to 450° F. Drawer-type ovens or conveyor ovens in a variety of designs are available for this purpose, heated by gas, oil or electricity. Recirculation and automatic controls are desirable accessories. Drawer-type ovens have the advantage that cores of like size can be placed by themselves and given a baking cycle suitable to their size.

Conveyor ovens save labor and are to be preferred for production work provided the variation in core size is not too great. At best, however, there is likely to be a greater percentage of defective cores from conveyor ovens due to overbaking in some cases, underbaking in others. For this reason conveyor ovens work best with cores of the polymerizing type where time and temperature are less critical.

Dielectric Baking—Conveyor ovens using the dielectric principle are a comparatively recent and revolutionary development. Baking time is reduced to minutes and cores leave the oven sufficiently cool for immediate inspection and use. Cores pass through the oven on a belt which forms the bottom electrode of a high-voltage, high-frequency electrical field. The top electrode is a steel plate, parallel to the belt at the top of the oven chamber, adjustable to provide clearance for cores of different height. The heat generated is within the core; the oven itself and its atmosphere remain at approximately room temperature so that there is little wasted heat. When baking is complete the generation of heat stops automatically. Overbaking cannot possibly take place no matter how long the core is exposed to the electric field. Small cores are fully baked in less than 5 minutes.

Special binders and additives are required for cores which are to be baked in a dielectric oven. A typical mixture is as follows: 500 lb dry sand (nearly clay free), 7 lb urea-formaldehyde binder, 3 lb cereal, 1½ lb boric acid, 1½ qt kerosene, 5½ qt water.

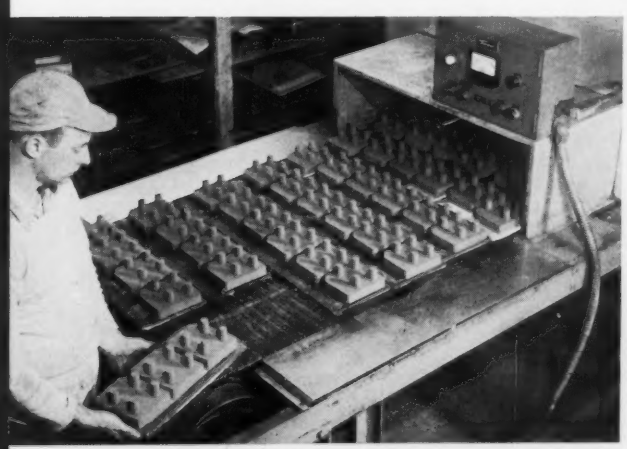
The hardness of the core and its flowability for difficult blowing jobs can be improved by increasing the binder and the proportions of kerosene

and water. The urea binder has caused complaint in some foundries because of the disagreeable odor which results when the castings are poured. Other organic binders have found some use and the urea type may ultimately be replaced in general use.

The use of dielectric baking imposes some limitations on the equipment which can be used. Reinforcing rods and wires made of metal are to be avoided and definitely cannot be used in a position at right angles to the parallel electrodes. Rods of plastic or paper make a satisfactory substitute and in this type of oven will not burn. Metal core plates cannot be employed but asbestos-cement composition plates, now commonly used in all ovens, are satisfactory and need not be pretreated for warpage. Driers must be nonmetallic and are usually made of plastic or an asbestos mixture.

Driers Expensive—The matter of driers is an important one. Many cores in the green state are sufficiently strong to stand upright during baking but many others require support or are so complicated in shape that they must lie flat in a fixture fitted exactly to their shape and size. These fixtures or driers are almost as costly as the corebox itself. In a conventional oven, with a complete cycle which may easily be as much as 2 hours, as many as 300 driers may be needed to keep a coremaker going on a single job. To avoid so fantastic an investment in driers, the number may be cut in half and the coremaker obliged to alternate jobs every hour. The advantage of a baking cycle which lasts less than 10 minutes instead of 2 hours is readily apparent.

Against the advantages of the dielectric method must be balanced the large investment required. The conversion of ordinary 60-cycle electric current to the high-frequency, high-voltage current needed by the dielectric oven involves costly electric equipment and there is nothing in sight to reduce its cost. A $20,000 investment will barely take care of the modest requirements of the smallest of brass foundries. Larger foundries, particularly those on a production basis, have a much better opportunity to enjoy substantial savings by adopting the dielectric method for at least part of their core production.



Close-up view of loaded core plates as they move by belt conveyor into high-frequency baking unit

Shell Cores—Two other coremaking methods are worthy of attention, although no final appraisal of either is possible up to the present. In a recent article on molding methods the shell process was described. In this process, sand is bonded with a synthetic resin to form a thin shell of desired shape. The same process can be applied to the making of cores, in which it has some added advantages. Whereas molding sand can be used over and over again, core sand, once bonded, is a waste material which can be made fit for reuse only after a costly reclamation process.

Shell cores use only a fraction of the material needed for conventional cores and it must be remembered that the core mixture is considerably more costly than a molding sand mixture. Thin shell cores naturally have a much smaller gas content than solid cores, with consequent less danger of gas trouble in the casting. Removal of core material from the casting is also simplified. Equipment has been devised to blow and bake simple shell cores within an elapsed period of about 15 minutes. The application of the shell method to complicated cores would seem to offer some difficulty.

Carbon-Dioxide Hardening—Cores can be made by the carbon-dioxide process, also described in the article on molding methods. Sand mixed with sodium silicate, plus certain additives to promote collapsibility, when treated with carbon-dioxide gas, becomes so hard and firm that no baking or drying process is needed to give it added strength. In other words, this type of coremaking does away with the need for any kind of core oven. If the cores are gassed while still in the corebox no driers are needed. Carbon-dioxide cores can be made to very exact dimensions with sharp corners and precise contours. Shell cores can be made in this manner. Carbon-dioxide cores give off very little gas when the casting is made.

It is too early to judge how large a part of the coremaking field will be pre-empted by the carbon-dioxide process although its potentialities are obviously great. There are problems still to be solved but it should be noted that this is one process which the small foundry can investigate without spending a great deal of money.

Judging from past experience and from present knowledge of the new coremaking methods, it is probably safe to say that no one of them is destined to take over the whole business of coremaking. At the same time it must be apparent that the brass foundryman should give a long look at all of them before committing himself to any change which involves heavy investment of capital or which might seriously interfere with the continuity of his production. Experiments should be on a scale consistent with his means or left for the present to those who can afford their cost.

—The End

Questions and Answers

Failure of cement sand to harden in corebox results from several causes . . . Small holes on interior of castings are produced by core gases . . . Heat treating castings increases machinability . . . Many methods are available for determination of the height of changes in the cupola

Cement Sand Fails To Harden

QUESTION We have had fair results making bronze pressure castings using high early strength cement as the bonding agent and air drying the mold. We tried to use the same sand in making cores and find they do not become rigid; in fact they crumble. Is there any way to bond with bentonite, then remove the corebox and let air dry for a few days? Could we use cement as a binder in core sand with oil and bake?

ANSWER Since you do not give any information on the cement sand mixture employed or the size of the cores, it is somewhat difficult to determine the reason why the cores failed to harden. Possibly the moisture content is low which results in a weak sand which might serve for molds under some conditions, and we suggest you look into that situation. One firm uses 1 part cement to 10 parts sand by weight, and the moisture content ranges from a minimum of 6.8 to a maximum of 8.6 per cent. It is pointed out that when the moisture is below the minimum the sand is weak and works poorly, and when above the maximum, it takes longer than the usual 72 hours drying time.

Again it might be that you are not using enough cement to provide proper bonding, and while the sand mix might serve in mass form for molds, it will be weak and friable in thin sections. At this point it may be advisable to point out that properly bonded cement sands are not recommended for small solid cores since they are hard to remove. For large cores where the interior can be filled with coarse, open material, cement-bonded sand as a facing a few inches thick serves quite well.

A core bonded with bentonite and air dried would not possess sufficient strength to be handled, and if baked probably would be too hard to remove. Cement in an oil-bonded core would not function as a bonding agent, since that property only is developed by water. Possibly you could make your cores satisfactorily by the carbon dioxide process—using a sodium silicate bonding agent and then subjecting the cores to the action of carbon dioxide. Information on core production by that method is given in considerable detail in an article "CO_2 Cores Reduce Production Costs" by Hans Jacob in the October, 1956, issue of FOUNDRY.

Core Causes Holes in Casting

QUESTION For your examination we are forwarding one-half of a fractured casting in which from time to time we run into this type of porosity or pinholes. Can you tell us the cause of the defect? We use a core in the opening, and pour iron with an analysis of 3.52 per cent TC, 2.18 per cent Si, 0.53 per cent Mn, 0.11 per cent P, and 0.126 per cent S. The defect is not visible until after machining operations.

ANSWER Appearance of the interiors of the numerous small holes in the casting leads us to the opinion that they are caused by gases emanating from the core. Since it occurs only spasmodically, it is difficult to determine the reason, and you will have to do some detective work to run it down. Possibilities include underbaked cores, plugged vents, accidental increase in binding agent in the core, and iron poured at a much higher temperature than usual. The numerous holes indicate a small but continuous evolution of gas as opposed to a sudden eruption, and the agitation or simmering action ceased just prior to formation of the solid skin of metal.

Slow evolution of gases from core at early metal contact causes holes

Anneal Casting for Machining

QUESTION We are thinking of putting in an annealing oven for treatment of gray iron castings which get too hard for good machining. The castings weigh not more than ½ lb each, and we produce about 1000 lb or more a week. We now are having them annealed outside but cost of the operation, including freight both ways, is too high. We know that the castings must be heated to 1450° F and held from 1 to 2 hours, but we do not know the best type of furnace for our use. We can get a furnace that was used for annealing malleable, but it is extremely large, and we would like something smaller.

ANSWER There is no doubt that the malleable annealing furnace, even if it were obtained practically as a gift, would be a white elephant for your operation. It seems to us that your best bet would be to purchase a small unit and use it each day rather than to get a large one and employ it once a week. Some figuring would have to be done, however, to determine the best economy. Heat treating furnaces are made in a variety of sizes and various factors would have to be considered.

You mention that the castings weigh about ½ lb each, but are they compact or rangy, and can they be packed without support? Small compact castings which can be packed on a tray or in a container of some type will occupy less space on the hearth than rangy castings, and a smaller furnace can be used. For example, if the daily production could be packed easily into a cube 1 foot on a side, it could be handled in a furnace with a 2 x 2 ft hearth. Possibly a smaller hearth might be used, depending on the manufacturer's recommendations.

As far as temperature is concerned Burgess in the January, 1954, issue of FOUNDRY recommended heating plain gray iron to 1300 to 1400° F, holding at temperature from ¾ to 1 hour per inch of section thickness, and cooling in the furnace at the rate of 100° F per hour from 1000

to 550° F, when castings are removed. Hence, we would recheck the 1435° temperature you mention, because the higher the temperature the longer the time to reach it, the higher the cost in obtaining it, and the longer the time for cooling.

Possibly even a smaller unit than mentioned earlier could be used by dividing the daily production into several batches. Instead of letting the castings cool in the furnace, take them out and immediately place them in a heavily insulated chamber or bury them in a box filled with vermiculite or other granular insulating material for slow cooling. Again by good scheduling and handling it would be possible to employ furnace cooling, and heat treat two batches of castings a day. The second batch, of course, would be left in the furnace overnight to cool.

With this brief discussion we suggest you take up your problem with any of the several manufacturers of heat treating furnaces whose names and addresses may be found in the advertising section. From his experience in the field, the manufacturer will be able to recommend a unit which will fill your needs.

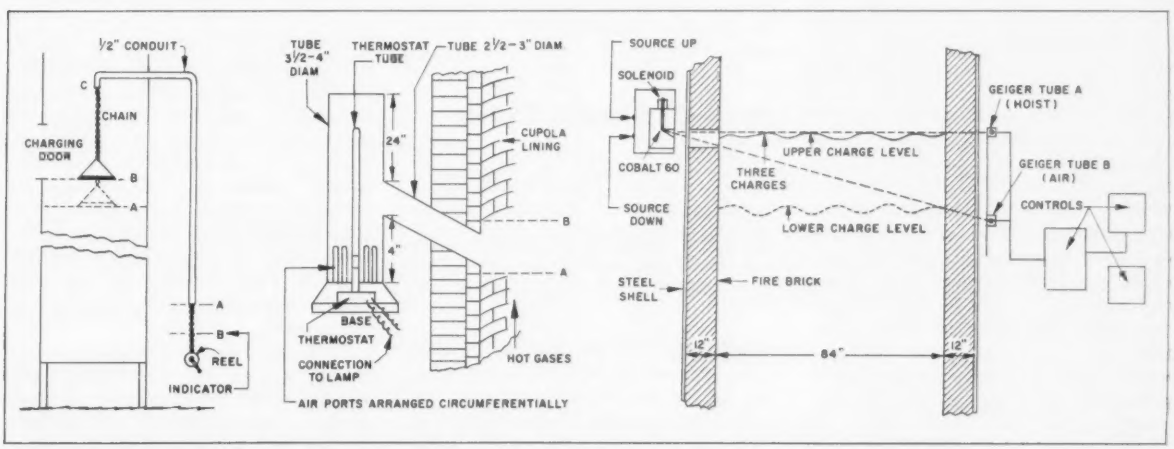
Measure Cupola Charge Height

QUESTION In our foundry in Italy we have a set of hot blast cupolas installed. While the charging is automatic we have to have a man stationed on the charging platform to watch the operation and signal to operators below when charges are required. The charging platform man could be eliminated if there was some way that the height of the charges in the cupola could be determined from the ground level. Can you tell us whether some device or apparatus is available which will accomplish that or offer some suggestions?

ANSWER It appears to us that if your cupolas are not operating under conditions which call for a variable melting rate from time to time, that you can determine reasonably closely when charges are required in the cupola. If your cupola is melting at the rate of 10 tons per hour, one ton would be melted every 6 minutes, and with 2000-lb charges, it means that one should be placed in the cupola every 6 minutes. With a 1500-lb charge the interval would be 4½ minutes, etc. After ascertaining the time interval by calculation, it may be advisable to check the figure by timing the descent of the charges in the cupola at various times during several days' operation.

As far as mechanical and other devices or equipment for determining the height of the charges in the cupola are concerned the simplest in our opinion is that shown in Fig. 1 which employs a weighted plate attached to a light, but strong chain of sufficient length to reach to the ground level. Plate of course, must be heavy enough to overcome the weight of the chain. The plate should be 10 to 12 in. in diam so that it will rest on the top of the charge in an approximately level position. Lower end of the chain is attached to a reel so that it may retract the plate upward and out of the way when the metal charge is placed in the cupola. Chain preferably is encased in a smooth interior conduit or pipe so that there is no interference to its movement. Suspension point *C* in the sketch should be high enough that the bottom of the plate can be drawn up out of the way to permit charging. Lower end of the chain as shown should be equipped with some type of indicators or markers in appropriate locations on the chain. Indicators simply may be pieces of wire wound around the chain, or with a little ingenuity small dogs or catches may be attached which will trip levers or switches to ring alarm bells or light indicating lamps.

Another device described in the Feb. 19, 1953 issue of *Foundry Trade Journal* by R. I. Taylor is that shown in Fig. 2. This employs an expansible liquid, bulb type thermostat commonly used as an oven regulator in kitchen stoves as a sensing element. Device functions from the effect of hot gases passing from the cupola which strike the thermostat tube. The author points out that when the top of the cupola charge is at level *A*, the hot gases pass freely straight up the cupola walls. However, when the top of the charge is at level *B*, the materials obstruct the flow of gases and deflect a portion through the side tube against the thermostat tube. It might be that such a device might not function satisfactorily on a recuperator-type hot blast cupola where the hot gases are taken off at the vicinity of the charging door.



Sketches showing three different procedures for the determination of the height of metal charges in the cupola

Latest method of determining charge height is application of the rays emitted by metal isotopes as illustrated in Fig. 3. In this the shielded ray emitter, cobalt 60, is located in a suitable position on the cupola wall, and its rays picked up by sensors, Geiger counters, mounted in predetermined locations on the opposite wall. When an obstruction such as the charge comes between the ray source and the sensor, there is a reduction in emission or signal due to absorption, and that is indicated in the metering system. Additional electronic equipment may be incorporated to provide automatic control of charge height as well as shutting the cupola down when charges get too low.

Carbon Content Runs Too High

QUESTION For the past couple of years we have been experiencing a slow but steady increase in the carbon content of both our plain and alloy gray irons. While high carbon is not detrimental to the plain iron, and sometimes desirable, we like to have reduced carbon content in the alloy irons for high strength or abrasive resistance. While at one time a 40 per cent steel charge gave iron with 3.20 to 3.35 per cent Tc, it now runs 3.60 to 3.80 per cent, and increasing the steel content does not give the desired results. Cupola we are using is lined to 33 in. with a 47-in. bed to insure hot iron from the beginning. Windbox pressure according to a mercury gage runs 7 to 8 oz. Since most of our work is the alloy iron field we standardized some years ago on a metal charge of 300 lb with a 50-lb coke split.

ANSWER It appears that the increase of carbon content began about the same time or shortly after you made the change in the iron charge and coke split. Presumably at the time of the alteration you were having melting difficulties, and we suspect it was due primarily to poor coke quality although it may have resulted from some other cause. However, with good quality coke, increase in the quantity used between charges usually results in increased carbon pickup, and our surmise is that improvement in the quality of the coke at some time after you made the change is causing your trouble. Hence, we suggest trying a gradual reduction of the amount of coke between charges without changing the blast volume. We would try reducing to 45 lb and observe the effect, and then to 40 lb. That will be a ratio of 7.5:1, and we expect with good coke that you could obtain hot iron with an iron-to-coke ratio of 8:1.

Another procedure would be to experiment with increasing the blast volume or weight. Your pressure of 7 to 8 oz seems low when compared to the usual 14 oz pressure. While the density/volume relationships of the charges and the coke splits have considerable effect on the measured pressure of the air blown into the cupola, we believe that your air should be increased—but do not under any condition change air and coke at the same time. By reference to density/volume relationship we mean whether the charged materials form compact or loose layers. When they are loose or open, the air can penetrate easily, but when they become more compact, penetration of air becomes more difficult and develops higher resistance or back pressure which is measured by the gage.

Assuming that your 33-in.-diam cupola is melting at the rate of 3½ tons per hour with an iron-to-coke ratio of 6:1, coke consumption is 1167 lb per hour. If 134 cu ft of air is required to burn up 1 lb coke, then about 2620 cu ft air per minute is required to operate the cupola.

Lining Life May Not Decrease

QUESTION For a long time we have been melting from 6 to 9 tons a day in our cupola lined to 42 in. We use pig iron and gray iron scrap, and during that time have had to line the cupola only once a year. Now we are thinking of including 30 per cent steel scrap in the metal charge and wonder if that would be harder on the lining.

ANSWER Provided the scrap steel you are going to include in the metal charges is not too rusty and thin in section, and you do not make any radical changes in melting procedure, we do not believe there will be much difference in refractory consumption. Steel scrap being low in carbon will require some additional coke—about 3 lb per 100 lb steel—to supply additional carbon for absorption by the steel, but we doubt any other changes will be needed.

Metal Mold Coating Blisters

QUESTION We make some of our aluminum castings in permanent molds, and at present are using a carbon solution. However, as the carbon builds up on the mold face it blisters under heat, resulting in pock marks on the casting surface. Can you suggest some other coating material?

ANSWER It is our impression from your remarks on build-up and blistering of the coating material that the trouble lies mainly in the method of application rather than faulty material. Heavy coatings tend to spall, crack and blister, so they studiously are avoided. Usual method which pays well for the time involved is to apply thin coats initially until the coating is built up to the desired thicknesses on the various areas of the mold face.

Correct thickness depends, of course, on the cooling rates wanted. After that coating is established, further applications are limited to those necessitated by wear of the coating due to operation. In some instances recoating once or twice a day is sufficient while in others recoating may be required after each run of a certain number of castings. We suggest you study your operations and hold recoating to the minimum.

As you undoubtedly know, mold coatings usually are composed of refractory suspended in water with or without addition of sodium silicate as a suspensory agent. Refractories include graphite, rouge, whiting, clay, etc. or combinations of these materials. A number of manufactured materials are on the market and may be obtained from firms whose names and addresses may be found in the advertising section. We believe you will be better off to purchase a prepared mold coating than to experiment trying to develop a satisfactory one yourself. Manufacturers additionally have the benefit of wide field experience with their products and applications.

Line Journals Centrifugally

QUESTION We will appreciate information on equipment for casting babbitt linings in large cast iron journals. The journals range from 5 to 30 in. ID and 10 to 45 in. OD with lengths proportional to the ID in the ratio of 1:1 to 1¾:1. The journals are not symmetrical and provisions for the unbalance have to be incorporated in the design. Can you tell us how this is accomplished?

ANSWER Information from one of the manufacturers of centrifugal casting machines states that the practice in the case of lining unsymmetrical journals is to construct machines which are heavy and strong enough when mounted firmly on suitable concrete foundations that they will withstand unbalanced loads. Additional weights are located by trial in such position on the machines that excessive vibration is minimized.

With large size journals, machines which spin on the vertical axis are recommended because they permit greater ease in loading and unloading as well as location of the journal on the machine table.

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. . . new Canadian foundry

JOSEPH J. MANZELLA was named plant manager, Reading Gray Iron Castings Inc., Reading, Pa. He continues as production manager, a position he has held since 1947. Mr. Manzella joined the company in 1945. **Rex Harrison,** appointed sales manager, has been with Reading Gray Iron Castings since 1950, when he was graduated from Michigan College of Mining and Technology. He was previously metallurgical and sales engineer.

Mellor W. Stevenson was named general manager of Railway Division sales, National Malleable & Steel Castings Co., Cleveland. **Howard Stark** has succeeded Mr. Stevenson as general manager of the division's sales in St. Louis. Mr. Stevenson, with National since 1950, became a salesman in 1951 and St. Louis sales manager in 1955. Mr. Stark was formerly assistant sales manager of the St. Louis office.

Arthur J. Buckley, for the past year sales manager, Pangborn Corp., Hagerstown, Md., has been appointed general sales manager. Prior to joining Pangborn in 1952 he was associated with Harnischfeger Corp., Milwaukee.

Warren Carlin, until recently associated with Benton Harbor Malleable Industries Inc., Benton Harbor, Mich., recently joined Middle States Foundry Corp., as superintendent of foundry operations.

● **Joseph B. Gutenkunst** was named president, Milwaukee Malleable & Grey Iron Works and Milwaukee Tool & Equipment Co., Milwaukee, succeeding his brother, the late Charles A. Gutenkunst. Since 1931 Joseph Gutenkunst was secretary-treasurer. He will continue as treasurer and **William R. Kerner** was named secretary of both companies. **F. A. Preiss** was named assistant secretary-assistant treasurer, and **John Thayer** continues as sales manager of Milwaukee Tool & Equipment Co.

Raymond L. Purcell was named vice president-foundry sales, and **James J. Conley** was appointed secretary, Oberdorfer Foundries Inc., Syracuse, N. Y. Mr. Purcell joined the foundry in 1943 as supervisor of quality procedures. He was transferred to the sales division and in 1945 became its manager. Mr. Conley, with Oberdorfer since 1927, was office manager since 1947.

Carl E. Tack, for the past year assistant vice president of the Transportation Equipment Division, American Steel Foundries, Chicago, was appointed chief mechanical engineer for the division. He joined the company's product engineering department in 1937.

Philip K. McCullough, formerly vice president-sales, Mercury Mfg. Co., Chicago, has been elected executive vice president-assistant treasurer of Mercury, now a division of Pettibone Mulliken Corp., Chicago.

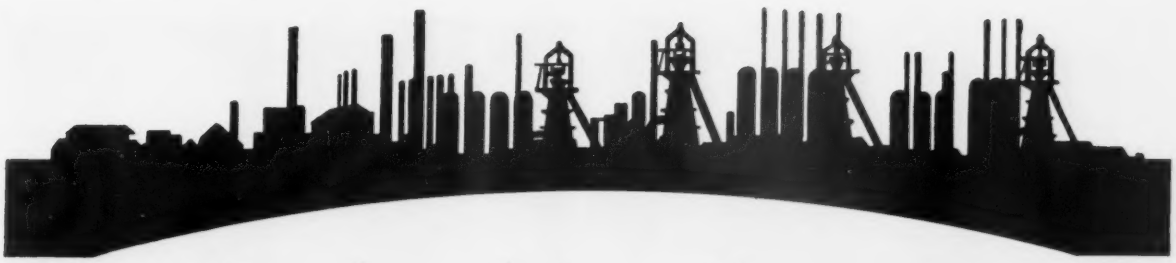
● **W. D. Bailey Jr.,** vice president and general manager, Westlectric Castings Inc., Los Angeles, has been appointed manager, Coquitlam Development Co. Ltd., Vancouver, B. C. The company is building a steel foundry at Port Coquitlam. Mr. Bailey had been with Westlectric since 1941. He is a past director of the Steel Founders' Society of America and a past president of the Southern California Chapter, AFS.

John F. Torley, since 1953 assistant plant superintendent of the Sharon, Pa., plant, National Malleable & Steel Castings Co., Cleveland, was appointed general superintendent of its Capitol Foundry Division, Phoenix, Ariz. He joined the Sharon works in 1946, and became superintendent of the finishing department in 1948.

William J. Goodwin, formerly with the research and development division, Electro-Metallurgical Corp., Niagara Falls, N. Y., was appointed research engineer in the crucible laboratory, Electro Refractories & Abrasives Corp., Buffalo. He is a graduate of Missouri School of Mines.

Frank Turk, since 1954 foundry superintendent, Joy Mfg. Co., New Philadelphia, O., was recently appointed quality control manager there.

Reginald L. Johnson was elected vice president, Johns-Manville Corp., New York. As sales promotion man-



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POLICIES
as well as its own
PIG IRON

WOODWARD Iron Company has always taken pride in its position as a strictly independent private enterprise—founded in the tradition of the "land of the free" by pioneers of courage, resourcefulness and vision.

Through a period of more than 74 years, Woodward has maintained its independence, and grown in the American way.

While expanding from a small company into one of the nation's largest independent producers of merchant iron, Woodward has always maintained the consistently high quality and uniformity of its merchant iron.

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Phone Bessemer, Ala. 5-2491
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609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.

Woodward Iron Company
WOODWARD, ALABAMA
Independent Since 1882

Circle 629 on Inquiry Card—Page 51

● K. M. BARTLETT
. . . heads Horizons Inc.

● PAUL W. HOOK
. . . Wellman executive v. p.

● GLENN F. IHRIG
. . . sales v. p., Wellman

● GENE FAUBEL
. . . assistant sales mgr.

ager he succeeds **H. M. Shackelford,** who retired after nearly 30 years of service. Mr. Johnson became senior advertising manager for the company in 1944.

● **K. M. Bartlett** was elected president of Horizons Inc., Cleveland, succeeding **Edwin T. Goodridge,** resigned. Prior to joining Horizons in 1955 as executive vice president of the materials and process research organization, Mr. Bartlett was associated for 26 years with Thompson Products Inc., Cleveland.

H. E. Pollard was appointed chief engineer of the Lindberg-Fisher Division, Lindberg Engineering Co., Chicago.

● **Robert A. Laws,** formerly assistant chief engineer, was named manager of sales engineering, Baker-Raulang Co., Cleveland. Mr. Laws was graduated from U.S. Naval Academy and later did postgraduate work in engineering at University of California.

● **Paul W. Hook,** formerly treasurer and assistant to the president, Wellman Bronze & Aluminum Co., Cleveland, was named executive vice president-treasurer. **Glenn F. Ihrig,** until recently general sales manager, was appointed vice president-sales. **Gene Faubel,** who was sales engineer for the company, was made assistant sales manager. **Harry Allchin,** formerly vice president-sales, continues as vice president and a director of Wellman.

● **James P. Godfrey** was appointed Southeastern district representative, Erie Strayer Co., Erie, Pa., to cover Tennessee, North and South Carolina, Georgia, Florida, Alabama and Mississippi. Previous associations include Multiplex Machinery Co., Elmore, O., and Multipak Inc., Cleveland.

● **L. C. Hewitt** was elected vice president-research and development, Ironton Fire Brick Co., Ironton, O. He joined the company in 1955 as director of research. A graduate of Iowa State College, Mr. Hewitt has had wide experience in development, manufacture and application of refractories.

Albert J. Gerretsen was honored recently at a dinner given by fellow employees and executives upon his retirement from Buffalo Forge Co., Buffalo, after 48 years with the company. He started as a molder in 1909, became assistant superintendent of the foundry in 1917 and since 1927 was foundry superintendent. Mr. Gerretsen's father, and grandfather were employees of the company. His son Raymond is assistant foundry foreman.

Dar Johnson Jr., manager of the advertising department, Electric Steel Foundry Co., Portland, Oreg., was recently elected president of the Oregon Industrial Advertising Association there.

● **Arthur Hoffheimer Jr.** has returned to his former position as vice president, Buckeye Products Co., Cincinnati, and will also serve as sales manager of the foundry division. Mr.

● ROBERT A. LAWS
. . . sales engineering mgr.

● JAMES P. GODFREY
. . . joins Erie Strayer Co.

● L. C. HEWITT
. . . research-development v. p.

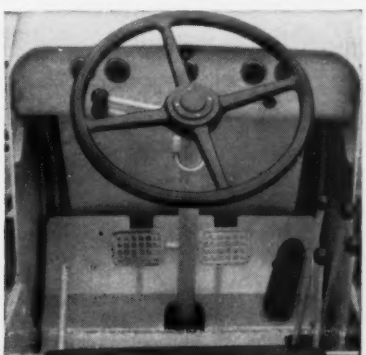
● ARTHUR HOFFHEIMER JR.
. . . Buckeye Products v. p.

If you had to drive a car for 8 solid hours in traffic like this . . .

would you be satisfied with an old fashioned gear shift?

Even an antique car enthusiast will have to admit that a manual gearshift is a tiresome business when you're caught in a traffic jam—when you have the constant clutching, and declutching and inching along in bumper-to-bumper traffic.

Did you ever recognize the similarity between a traffic jam and a typical bulk-handling job? In both cases, the runs are relatively short, constantly Stop and Go (and in bulk handling, constantly Forward and Backward). The automobile manufacturers long ago took this burden off the driver by giving him various types of "clutchless" transmissions. Now Clark has done the same thing for the industrial Tractor Shovel operator: Clark's exclusive Power-Shift transmission on the 16 cu. ft. MICHIGAN Model 12B.



No clutch pedal, no engine clutch

The small photo at left shows the operator's compartment of the MICHIGAN Model 12B. There's a double brake pedal—operate it with either foot. There's no clutch pedal, no engine clutch, no gear clash when shifting. This heavy-duty Clark transmission is as fast and as easy to operate as a modern car—the driver merely selects High-Low-Forward or Reverse and lets the Power-Shift transmission do the work. He can make any shift while moving in either direction.

Improves operator efficiency

Power-shifting drastically reduces operator fatigue. The MICHIGAN operator doesn't have to ride a clutch all day. He can work smoothly and easily through peak periods throughout the day and still be close to top efficiency when bulk-handling runs overtime. New operators can learn to run the MICHIGAN Model 12B in a few hours. And when several operators take turns on the MICHIGAN, the machine doesn't suffer—the hydraulic-operated Power-Shift transmission provides built-in protection against "clutch riders" and "cowboys."

See for yourself

Without any obligation, you can put the MICHIGAN Model 12B to work on any job in your own plant. We'll bet the MICHIGAN will outproduce any loaders in its size range, bar none. You be the judge. Clip the signature below to your letterhead and mail to us—we'll make the arrangements for an on-the-job demonstration.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2475 Pipestone Rd.
Benton Harbor 4,
Michigan

CLARK® EQUIPMENT

Circle 630 on Inquiry Card—Page 51

● HERBERT F. SCOBIE
. . . NFFS executive secretary

JAMES W. WOLFE
. . . NFFS secretary retires

● FRANK G. FALLER
. . . retires, Corn Products

● WILLIAM J. LAUGHLIN
. . . Thor Tool division mgr.

Hoffheimer has been on leave of absence in Florida for two years due to illness in his family.

● **Herbert F. Scobie** was named executive secretary, Non-Ferrous Founders' Society, Chicago, succeeding **James W. Wolfe,** who retired recently after 10 years in that capacity. **Darlene D. McDermott** was appointed assistant secretary-treasurer. Mr. Scobie was graduated from University of Minnesota, and after two year as chief chemist at American Hoist & Derrick Co., St. Paul, returned to the university in 1938 and taught foundry practice, acting also as consultant in the Minneapolis-St. Paul area. He took charge of educational activities of American Foundrymen's Society, Chicago, in 1945, later becoming editor of *Modern Castings*. Mr. Scobie joined the NFFS last summer as field manager. Mrs. McDermott was also previously associated with *Modern Castings*. Mr. Wolfe has retired to 507 East St., Cassville, Mo., near his Aberdeen-Angus farm.

Richard K. Teske and **George T. Haffermehl** were appointed sales representatives, Leschen Wire Rope Division, H. K. Porter Co., St. Louis. Mr. Teske will cover Michigan and northern Indiana. Mr. Haffermehl has been assigned to the New England states and eastern New York.

E. Lacy, formerly in the Detroit office, Oakite Products Inc., New York, has been transferred to Houston, Tex. **John C. Ruttle,** who recently joined the company, will cover western Detroit.

Bernard N. Ames, president, Columbian Bronze Corp., Freeport, N. Y., was named a director of John B. Salterini Co., New York, manufacturer of wrought iron furniture.

● **Frank G. Faller** was honored recently with a farewell luncheon by co-workers, upon his retirement from Corn Products Sales Co., New York, after nearly 40 years of technical service. After early associations with Pratt & Letchworth and Acme Steel & Malleable Iron Works, Buffalo, as well as T. H. Symington & Co., Rochester, N. Y., he joined Corn Products in 1917. Mr. Faller helped formulate new products and demonstrated their uses in the foundry and in later years trained foundry sales-service technicians.

Harold Dirkers was named St. Louis branch manager, Barber-Colman Co., Rockford, Ill. **Howard Berger** was appointed Cleveland manager and **Norman H. Fertig** joined the service staff there. **Stanley Hanson** recently became Detroit branch manager and **George Hall** is a new sales engineer there. **Louis D. Gercken** has joined the Atlanta sales staff. **Hyman Hacker** and **Shelton Cashbaugh** were named sales engineers, and **Robert B. Sanquist,** a service engineer, in Los Angeles. **Joseph S. McDonnel** and **John M. Schneider** were named service engineers in Philadelphia, and **Henry L. Byrne,** sales engineer. **William C. England** was named service engineer and **Kenneth J. Munhall,** sales engineer in Pittsburgh. **Herman J. Schneider, Edward J. Pasch** and **Roger S. Williams** joined the application engineering group in Rockford.

Martin A. Bertram, for 3 years service engineer in the Detroit area, Thor Power Tool Co., Aurora, Ill., was appointed manager of a new Great Lakes electric tool sales zone to include Detroit, Pittsburgh, Cleveland and Buffalo offices. His headquarters will continue in Detroit.

● **William J. Laughlin** was appointed industrial division manager, Thor Power Tool Co., with headquarters in the company's new executive office in Chicago. Mr. Laughlin joined the company in 1946 as service engineer in the Birmingham branch. **Clarence H. Gabriel** has succeeded Mr. Laughlin as Los Angeles manager. **Mark A. Sorenson** takes over Mr. Gabriel's former duties as Denver manager, and **John L. MacDonald,** formerly Newark, N. J., manager, has succeded Mr. Sorenson as Philadelphia manager. **Albert C. Cheswick** was named branch manager in Newark. He was formerly Houston, Tex., service engineer.

Alfred L. Boegehold recently retired as manager of research activities and assistant to the research vice president, General Motors Corp., Detroit, but continues as staff consultant. During 36 years with the company he was honored by the AFS and ASM in recognition of outstanding contributions in the field of metallurgical research. As a result of Mr. Boegehold's retirement, **John M. Campbell** was named scientific director for the company. He was technical director since 1954. **Arthur F. Underwood** was appointed manager of research staff activities. **Gregory Flynn Jr.** has succeeded Mr. Underwood as head of the mechanical development department.

John H. Alden was named assistant chief metallurgist, metallurgical division, Aluminum Co. of America, Pittsburgh. **John W. Hood,** also assistant chief metallurgist of the division, assumes the additional duty of co-ordinating control activities. **Howard J. Rowe** was named chief metallurgist of the fabricating division. Other changes within the fabricating division, which recently

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"Not one blow has been experienced with CO_2 hardened cores"

Cured a 5500 lb. mold in 40 minutes

Cures our cores perfectly in 20 seconds

Reduced our core room space by 2/3

Far fewer gaggers needed in molds

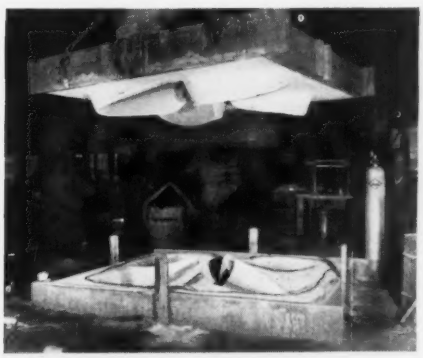
No danger of drops, soft spots or wet spots in molds

Eliminates 60% of our core handling

Molds may be left for several weeks without pouring

Over-all costs of making cores have been reduced by more than 50%"

FOR CORES
Liquid Carbonic CO_2 core curing set-up in operation at Pacific Brass Foundry, San Francisco, California.



FOR MOLDS
Fast, bakeless hardening of molds for large castings—like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

About the amazing CO_2 process for curing cores and molds

Learn why foundry men the world over are so enthusiastic over amazingly fast bakeless core and mold curing. CO_2 curing is as easy as it is inexpensive. Liquid Carbonic's free folder gives complete instructions. Or, if you prefer, a trained "Liquid" representative will call on you and conduct a demonstration. Just mail the coupon.

World's Largest Producer of CO_2

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☐ Send me your free instruction booklet on CO_2 core curing.

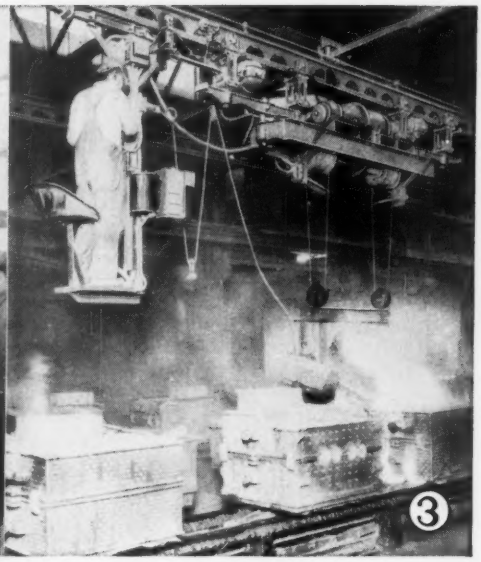
☐ Have your representative call and give me demonstration of CO_2 core curing.

Name_____

Company_____

Address_____

City_____ Zone____ State_____



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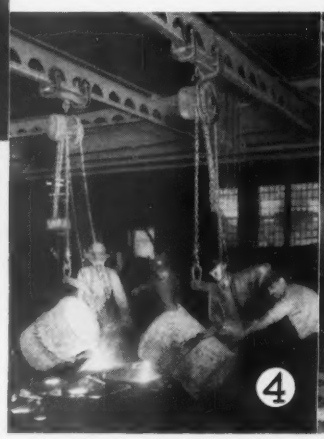
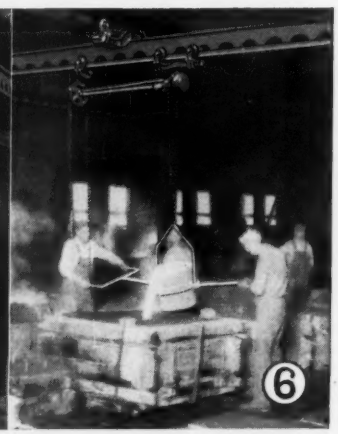
POURING IS EASIER • FASTER • SAFER *with* CLEVELAND TRAMRAIL

Hundreds of foundries have speeded pouring and made the work easier and safer with Cleveland Tramrail overhead materials handling equipment. Why not check and see what it can do for you?





1 Small gray iron

2 Centrifugal pouring

3 Large scale continuous production

4 Large malleable

5 Brass and bronze

6 Large gray iron

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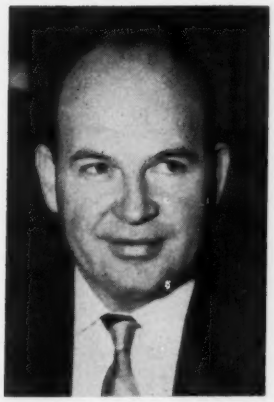
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT



● LOREN W. SMITH
. . . *joins Symington-Gould*

● JOSEPH W. CAMPAU
. . . *Misco Detroit mgr.*

● EMERY E. KUHARY
. . . *division chief engineer*

● EDWIN G. CHAPMAN
. . . *Misco division mgr.*

incorporated castings division operations, include **Sanford H. Bennett,** chief industrial engineer, succeeding **H. B. Kahle,** retired, and **J. A. MacLeod,** assistant chief industrial engineer.

● **Loren W. Smith** recently joined Symington-Gould Corp., Depew, N. Y., as assistant vice president and director of metallurgical development. For the last 14 years he was head of the metallurgy section, materials department, Cornell Aeronautical Laboratory, Buffalo.

Owen J. Pritchard, formerly vice president-operations, Milwaukee Solvay Coke Co., Milwaukee, was named executive vice president. Mr. Pritchard has been with the company over 40 years. **Louis G. Kreuz,** president, and all other officers were re-elected.

● **Robert D. McWhorter** was appointed sales representative, Mexico Refractories Co., Mexico, Mo., with headquarters in Birmingham. He previously represented Pittsburgh Plate Glass Co. there.

● **Edwin G. Chapman** was named manager of Misco Precision Casting Co.'s experimental division, Muskegon, Mich. Associated with the company since 1951, he was recently plant superintendent. **Emery E. Kuhary,** formerly project engineer at the Detroit plant, has been made chief engineer of the division. He joined Misco in 1955. **Joseph W. Campau,** who joined the company last November, was appointed manager of the Detroit Division, succeeding **Joseph H. Cadieux,** recently appointed vice president-manufacturing.

Robert S. Day was named to head the metalworking industries market, Leeds & Northrup Co., Philadelphia. He joined the company in 1948 and was formerly sales engineer in the St. Louis office.

● **Ray Neubecker** was appointed California representative, Lester-Phoenix Inc., Cleveland, with headquarters in Pasadena. He has spent 15 years in the plastics and die casting industry.

John C. Linsenmeyer was elected executive vice president-operations, American Radiator & Standard Sanitary Corp., Detroit. He was formerly president of the American Blower and Ross Heat Exchanger Divisions of the company. **John W. Brennan** was named president of American Blower Division, and **Richard S. Reade,** president of Ross Heat Exchanger Division. Additional American Blower appointments include **R. L. Bernhard,** vice president-engineering, succeeding **J. W. Brennan,** and **W. A. Gardner,** vice president-manufacturing.

David M. Flynn, formerly associated with the open-hearth department, U. S. Steel Corp., Gary, Ind., has joined Basic Inc., Cleveland, as sales representative of the company's granular refractories.

● **Bertram A. Kline** was elected assistant vice president-sales manager, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. Since 1953 he was sales manager of the steel castings and miscellaneous machinery di-

● ROBERT D. McWHORTER
. . . *joins Mexico Refractories*

● RAY NEUBECKER
. . . *Lester-Phoenix sales*

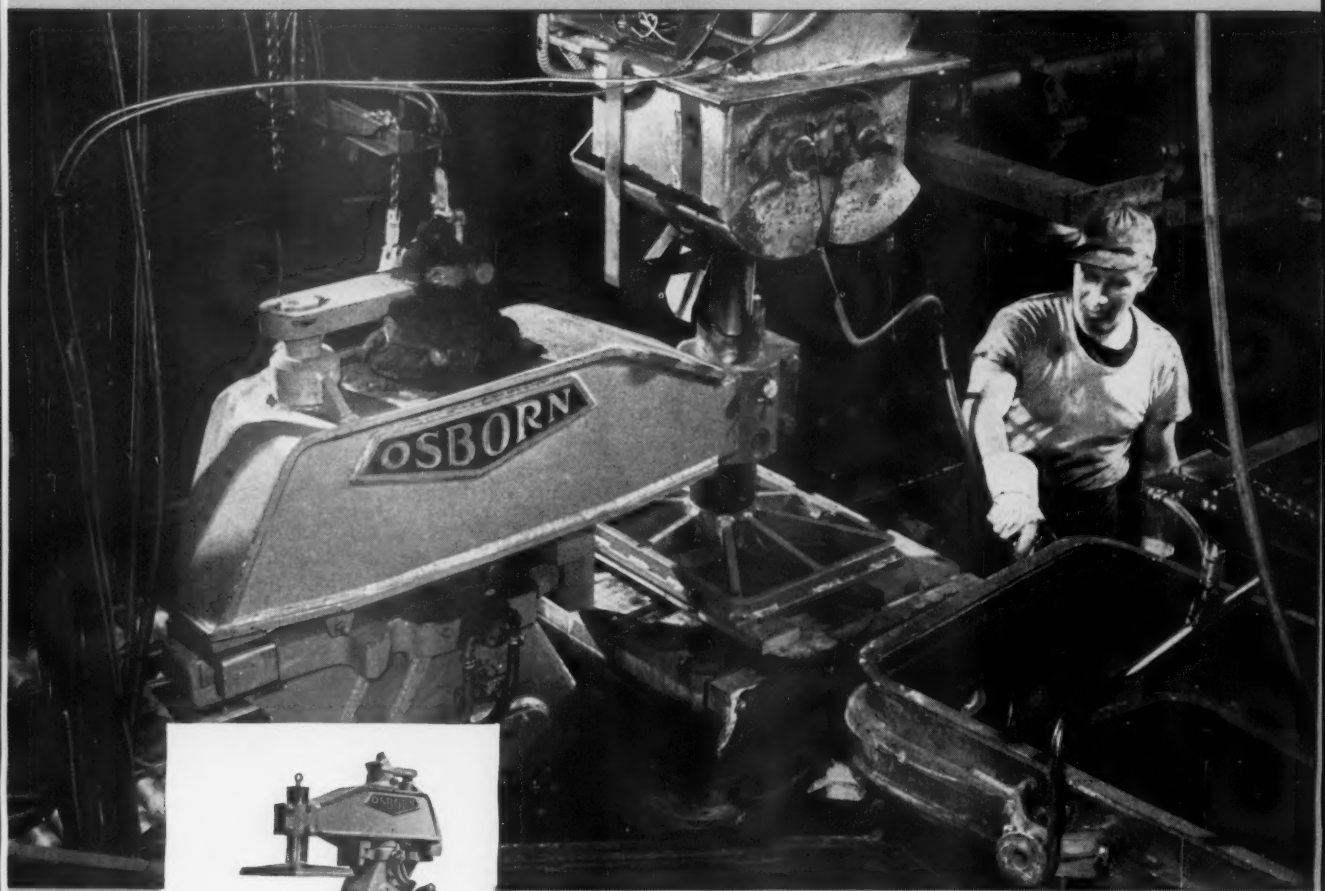
● JOHN L. ROSE
. . . *controller, Birdsboro*

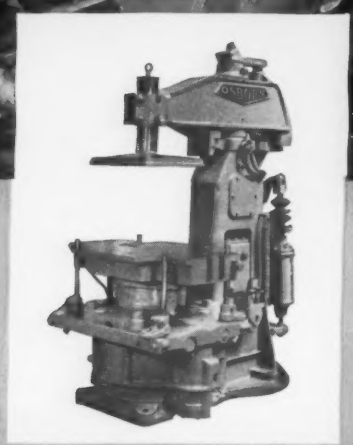
● BERTRAM A. KLINE
. . . *Birdsboro assistant v. p.*

"Production stepped up . . .
quality improved."

"Working conditions
really changed."

Westinghouse foundry

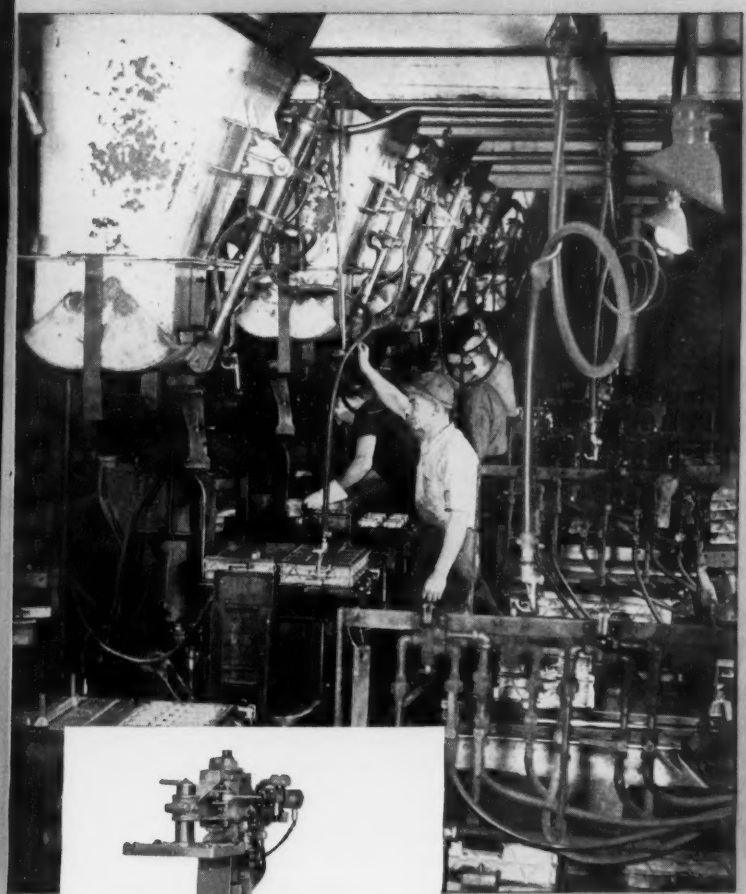


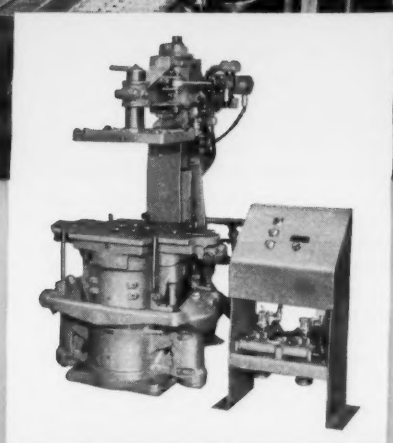


Osborn 721 PVA Automatic Vibrating Squeeze Pin Lift machines using 29" x 29" x 7/7 flasks.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

reaps the benefits from mechanization with OSBORN





Osborn 716 PVA Automatic Vibrating Squeeze Pin Lift machine using 12" x 18" x 4/4 flasks.

THEY'RE writing a new chapter in the production efficiency logbook at the East Springfield, Mass., foundry of Westinghouse Electric Corporation.

Mechanization with Osborn machines has paved the way for stepped up production and greater quality. But the mechanization program accomplishes an even greater benefit in the eyes of Westinghouse . . . it greatly improves working conditions.

The foundry mass-produces gray iron castings for components of electrical appliances. The castings range in size from one-half to 40 pounds.

Mechanization, which incorporates Osborn's vibrating-squeeze molding machines into an automatic handling system has reduced to one-fifth the amount of material handled per day.

Six steps—handling flasks, shoveling sand, conveying molds, shifting pouring weights, shaking out, and conditioning sand—are now carried out mechanically. Daily melt capacity has been increased 66%.

Let Osborn illustrate how foundry mechanization can become a money-making investment for your company. Write *The Osborn Manufacturing Company, Cleveland 14, Ohio.*

OSBORN

MOLDING MACHINES
CORE BLOWERS
SHELL MACHINES
INDUSTRIAL BRUSHES
BRUSHING MACHINES

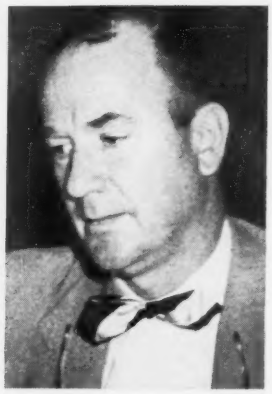
Leader in automation for the foundry

Circle 633 on Inquiry Card—Page 51

● DR. GERALD V. KINGSLEY
. . . research director

FRANK B. HUKE
. . . Norton division sales mgr.

ROLAND L. JANDRON
. . . Norton sales, Los Angeles



● W. A. BEARDEN
. . . heads Texas Chapter

vision, and general advertising manager. **John L. Rose,** formerly plant auditor, was named works controller for the company. Messrs. Kline and Rose have been with Birdsboro for more than 30 years.

● **Dr. Gerald V. Kingsley,** formerly chief metallurgist, was named director of research, Bohn Aluminum & Brass Corp., Detroit, succeeding **William E. McCullough,** retired. He is a graduate of Eastern Michigan College and Michigan State University. In 1946 Dr. Kingsley was one of the organizers of the Detroit section of the Society for Nondestructive Testing and has served as vice chairman of the group.

Edwin S. Lawrence was named manager of manufacturing engineering for the Schenectady, N. Y., foundries, General Electric Co. Associated with the Schenectady foundry since 1947, he was metallurgist in the brass and iron foundries, casting design engineer, and since 1953, superintendent. **William T. Herrick** has been appointed project engineer-structural, and **Kenneth N. McIver,** project engineer-electrical, at Schenectady foundry. Mr. Herrick joined the comany in 1953, and Mr. McIver in 1956. **Harold R. Kohl** was made manager-manufacturing engineering for the company's Erie, Pa., foundries. Since 1948 he was at the GE Elmira, N. Y., foundries, recently as specialist of advanced manufacturing engineering.

William L. Gillespie was named manager of sales administration, Hooker Electrochemical Co., Niagara Falls, N. Y. **John T. Walmsley** has succeeded Mr. Gillespie as manager of Chicago district sales. Mr. Gillespie has been with the company since 1939. Mr. Walmsley joined Hooker in 1950.

● **Frank B. Huke** was appointed sales manager of the new Electro-Chemical Division, Norton Co., Worcester, Mass., and will continue as chief atomic products engineer. Prior to joining the company last year he was with the U. S. Atomic Energy Commission. **Roland L. Jandron,** for the past year field engineer in Norton's Chicago office, has been transferred to the Los Angeles office in a similar position.

William C. Ruland was appointed Detroit district sales manager, Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia, succeeding **Neal Kemp,** who recently became a regional sales manager for the company's handling equipment in the Midwest. **Ralph W. Worsey Jr.** has succeeded Mr. Ruland as district sales manager of hoisting equipment in St. Louis. For the past 4 years Mr. Worsey was hoist sales representative in Chicago. **David P. McCarthy Jr.** has joined the division as hoist district sales representative for the Pacific Northwest, with headquarters in Seattle.

Regal C. Meier was named vice president, New Process Gear Corp., Syracuse, N. Y. Other officers recently elected include: **Ernest M. Allman,** secretary-treasurer and a director; **William L. Crowley,** assistant secretary; **Robert W. Wolfe,** director.

J. F. Forster was appointed executive vice president, Vickers Inc., Detroit. He joined the company in 1941 as treasurer and became vice president-assistant general manager in 1949.

Jack T. Conner was appointed abrasive engineer in the Youngstown, O., area for Sterling Grinding Wheel Co., Tiffin, O.

● **W. A. Bearden,** chairman of the Texas Chapter of the AFS, for the past 10 years has been Southwestern sales representative, M. A. Bell Co., St. Louis, with headquarters in Houston. He was associated with Oklahoma Steel Castings Co., Tulsa, Okla., from 1934 until 1941 when he joined E. I. duPont de Nemours & Co., Wilmington, Del., where he was engaged in construction and operation purchasing. Mr. Bearden was vice chairman of the Texas Chapter last year.

Harold M. Stiles was named western regional sales manager, Yale & Towne Mfg. Co., Philadelphia, succeeding **Frank Boufford,** who has joined the San Francisco sales-service branch. Mr. Stiles was sales manager and branch manager in San Francisco until last year when he returned to Philadelphia to head up the company's sales training program.

Charles E. Muller and **Ralph Piening** were named sales representatives in Chicago and at the Cincinnati general purpose equipment branch, respectively, Allis-Chalmers Industries Group, Milwaukee.

Marc B. Rojtman, former president, American Tractor Corp., Churubusco, Ind., was named executive vice president-general manager, J. I. Case Co., Racine, Wis., which recently acquired the tractor company.

Stuart N. Greenberg, president, M. Greenberg's Sons Brass Foundry & Machine Works, San Francisco, was recently named to the city public utilities commission.

Merle Nobel, formerly with the Cleveland office, Luria Bros. & Co., Philadelphia, was named district manager of the Cincinnati office.

. . . You'll cut snagging time—and save money on cleaning room costs—when you switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

Users all over the nation report that they like the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS. Our customers report, too, that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

So, if snagging problems have you yelling for help, throw your voice in the direction of your CINCINNATI Grinding Wheels distributor and get full details on (PD) WHEELS. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

CINCINNATI°
Grinding Wheels
A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

AFS CONVENTION PLANS

Near Completion

Final touches are being made to arrangements for the 61st AFS Castings Congress and 1st Engineered Castings Show in Cincinnati, May 6-10. Heavy demands for reservations indicate a capacity attendance, and as of Mar. 1, nearly 100 exhibitors had reserved display space.

The castings show will include exhibits of castings made by every modern method and in all types of metals. Other exhibits will display metals, patterns and testing equipment.

Papers to be presented at technical sessions of the congress will give the broadest coverage of foundry subjects in many years and will be particularly strong in the areas of management and design engineering. Numerous papers will be of prime interest to design engineers, and most will be presented at the Music Hall. Design engineers also will be interested in the annual Charles Edgar Hoyt Memorial Lecture, "The Past, Present and Future of Iron Castings," by Hyman Bornstein, and "An Automotive Engineer Looks at the Foundry Engineer," by H. F. Barr, chief engineer, Chevrolet Motor Division, General Motors Corp. No other sessions will be held when Mr. Barr's paper is presented at 2:30 p.m., Monday, May 6.

Six papers from abroad will be offered, including three official exchange papers. The Institute of British Foundrymen exchange paper is by Sir George Barnett of the Ministry of Labor and will deal with foundry health and safety. The French exchange paper concerns copper alloys and will be delivered by P. J. Le Thomas of the Centre Technique des Industries de la Fonderie. The third exchange paper, from the Institute of Australian Foundrymen, New South Wales Division, will deal with austenitic manganese steel technology in Australia.

Other foreign papers will deal with technical advances in brass and bronze (Association of Brass and Bronze Founders, England), temper embrittlement in nodular iron (British Cast Iron Research Association) and controlled gas content in foundry work in England.

Three separate panels will be offered. One, on May 6 at 8:00 p.m., will discuss malleable graphitization theory and mechanics. On May 7, at the sand shop course, at 8:00 p.m., the second panel will deal with sand control. The third will be presented at the education session at 2:30 p.m., May 9, and will concern manpower needs. In addition to the manpower needs panel, the second report of the Department of Labor on foundry manpower shortages will be made at the same education session.

The large number of papers on subjects of interest to foundry management includes presentations on statistical quality control and related subjects, noise control and radiation hazards and safety, hygiene and air pollution legislation affecting foundries.

The newly formed Management Development Committee of the AFS is preparing its first program for presentation at the congress.

Objective of the committee is to contribute to the education and development of present and future foundry managers and supervisors. Programs will be designed to furnish information on management problems and functions in areas other than those of production—essentially all nontechnical management functions except those which relate to organized labor. It is hoped that the work of the committee will expand so that more programs of interest and value to management will be presented at regional and chapter meetings of the society.

WILLIAM J. GREDE

The committee's session at Cincinnati will be held on Wednesday, May 8, after a luncheon at noon. William J. Grede, president, Grede Foundries Inc., Milwaukee, will speak on "Developing Foundry Management" and then will act as moderator of a panel comprised of the committee which will discuss the topic and answer questions.

E. C. Westover, president, Westover Corp., Milwaukee, is chairman of the committee, which also includes the following: Henning A. Forsberg, vice president, Continental Foundry & Machine Division, Blaw-Knox Co., East Chicago, Ind.; Leon J. Wise, vice president, Chicago Malleable Castings Co., Chicago; Harold W. Johnson, vice president, Wells Mfg. Co., Skokie, Ill.; and Chester K. Faunt, manager, Christiansen & Olsen Co., Chicago.

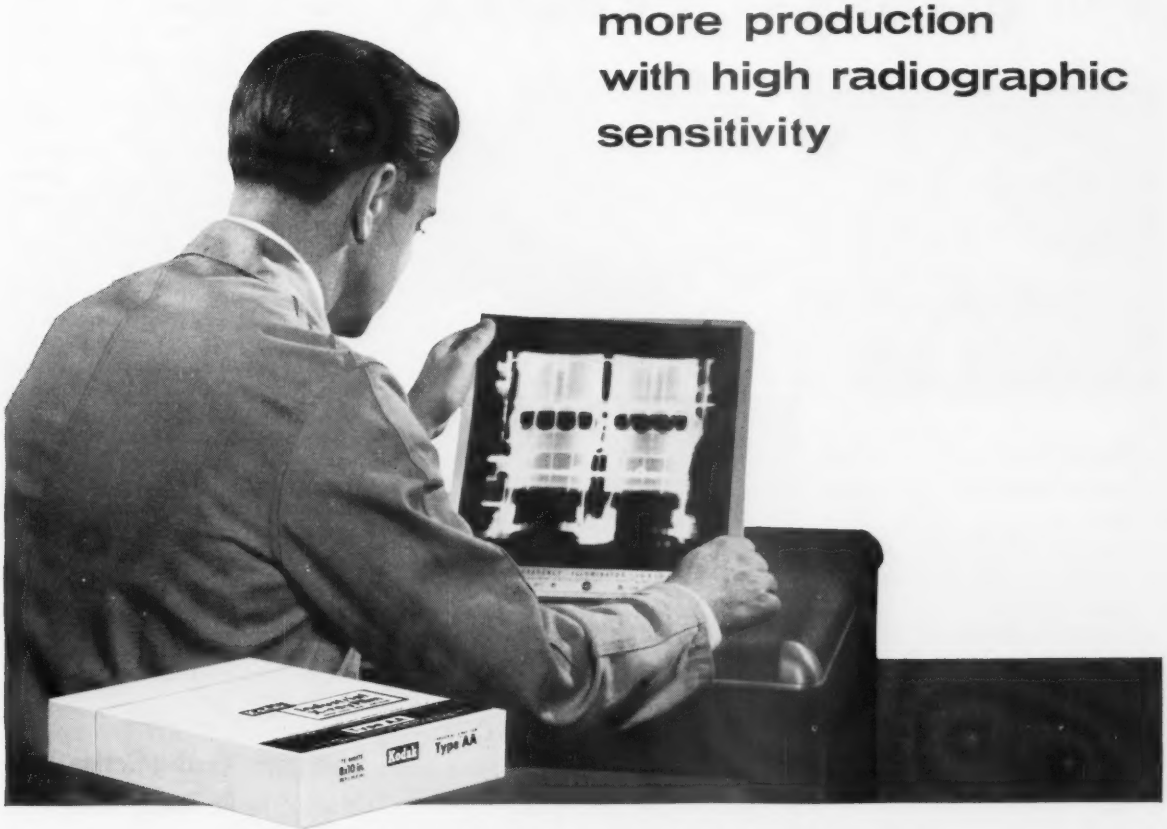
Cincinnati Chapter of AFS has established committees for the congress and castings show. The General Convention Committee includes E. H. King, Hill & Griffith Co., chairman; R. J. Westendorf, Dayton Castings Co., vice chairman; and E. J. James, Dayton Oil Co., secretary-treasurer. Other members include the chairmen and co-chairmen of other convention committees.

These other chairmen include the following: Martin Rollman, Cincinnati Milling Machine Co., Plant Visitation Committee; J. S. Schumacher, Hill & Griffith Co., and William R. Oakley, Delhi Foundry Sand Co., co-chairmen, Shop Course Committee; Roland Schwartz, H. Kramer Co., Publicity Committee; and E. J. James, Dayton Oil Co., Banquet Committee. A chairman has not yet been named for the Reception Committee. Wives of officers and directors of Cincinnati Chapter will serve as the Ladies Committee.

Dual registration facilities will be

WHATEVER YOUR PRESENT RADIATION SOURCE–

more production with high radiographic sensitivity



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Whatever source of radiation you use, you'll get more high-quality work done—faster—with Kodak Industrial X-ray Film, Type AA.

For Type AA has greatly increased speed—as much as twice as fast with gamma rays and high kv x-rays. It permits inspection of thicker parts, slashes exposure time, increases production and extends the usefulness of existing radiographic equipment.

And with all this increased speed the new film equals the fine radiographic sensitivity characteristics which made Kodak Type A the most widely used x-ray film in the industry.

Kodak Industrial X-ray Film Type AA can save you time; provide clear, easier-to-read radiographs; and help turn out more work. Get all the details—either from your Kodak x-ray dealer or the Kodak Technical Representative.

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- Reduces exposure time—speeds up routine examinations.
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You can SEE the difference...
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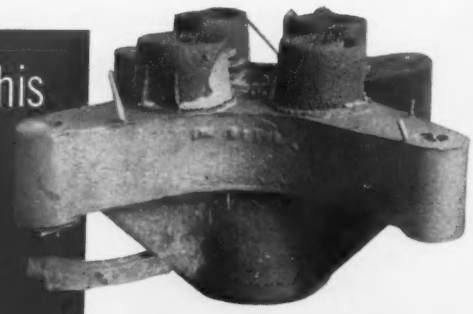
Compare this steel casting made the FOSECO way



Weight of Casting.....2772 lbs.
Weight of Residual Risers.....362 lbs.
Yield 88.5%
Feedex sleeves....9" high x 9" I.D. x 11" O.D.
Casting yield by conventional methods 52%

...with those made in your foundry.

FOSECO FEEDEX *will improve your casting yield...save wasted metal and dollars.*

FOSECO FEEDEX SLEEVES can be made in your foundry in a matter of minutes. Just mix with water, mold to shape, bake and ram up in mold. Grades are available for steel, iron, light and non-ferrous alloys. Prefabricated FOSECO Feedex sleeves can also be supplied in a wide range of standard sizes.

And you get all these advantages when you use factory-tested **FOSECO FEEDEX** —

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available at the Netherland-Hilton Hotel and the Music Hall. All sessions and events will be at the Netherland-Hilton or the Music Hall except the ladies events and the Canadian Dinner. The latter will be held at the Sheraton-Gibson Hotel on Tuesday, May 7.

The Non-Ferrous Founders' Society annual meeting will be held during the convention as usual. Its agenda includes a board meeting and luncheon on May 8, a luncheon and management session on the afternoon of May 9 and its annual dinner on the evening of May 9.

The annual AFS banquet will be held at 7:00 p.m., Wednesday, May 7. The speaker will be Warren C. Whitney, vice president, National Cast Iron Pipe Division, James B. Clow & Sons, Birmingham.

The ladies program include the Official AFS Tea, Monday afternoon, May 6, at the Netherland-Hilton; a luncheon and style show Tuesday noon at the Sinton Hotel; and a river cruise by excursion boat Thursday, with luncheon aboard.

Details of the technical programs, plant visitations and other convention features and a list of exhibitors will be presented in the May issue of FOUNDRY.

Investment Casting Design Manual To Be Ready Soon

Publication of its *Engineering and Design Manual* has been announced by the Investment Casting Institute for late spring.

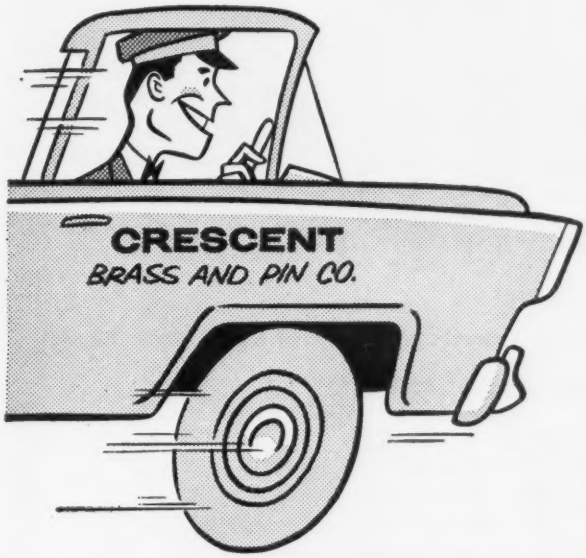
The 64-page manual is designed to aid industry to more clearly understand the advantages and limitations of the investment casting process. Rules governing design will be presented to cover questions of dimensional tolerances and shapes. Ferrous and nonferrous alloys recommended for the process will also be included, as will additional pertinent data.

Advanced orders for the manual, which will be priced at $5, may be placed with the Institute at 27 East Monroe St., Chicago 3, Ill.

West Coast Air Pollution Control Group Meets

S. Smith Griswold, Air Pollution Control Officer for Los Angeles County has been named chairman of the recently organized West Coast Section of the International Air Pollution Control Association. The new section is composed of nine western states, Canada and Mexico. First annual meeting of the group was held Mar. 25-26 in Los Angeles.

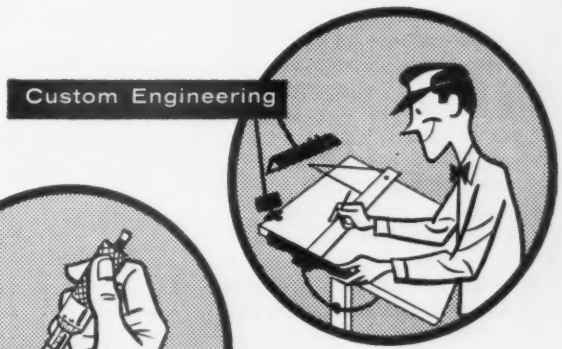
service

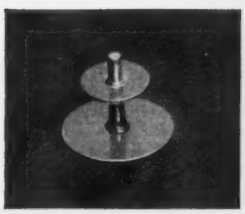


Our 67 years of serving the needs of industry have taught us that service means different things to many people. For instance, many foundry operations rely on our complete, convenient stock of chaplets. Others have come to know that our custom design facilities stand ready to answer their particular needs. And no job is too large or too small . . . chaplets are our business.

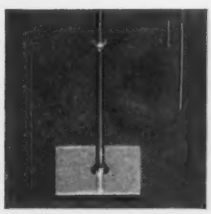
But you might say the "pay-off" for those customers has been our reputation for precision tolerances which form the foundation of every chaplet we design and manufacture.

Let us prove 67 years of experience right in your own foundry. Get to know the advantages of our superior reputation, facilities and service. Your products will reflect the benefits of this superiority.

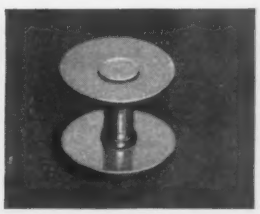




double head extended stem chaplet

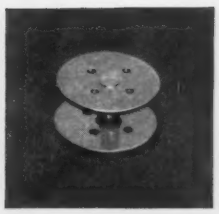


shoulder chaplet



boiler chaplet

radiator chaplet



perforated double head chaplet

CRESCENT BRASS & PIN CO.

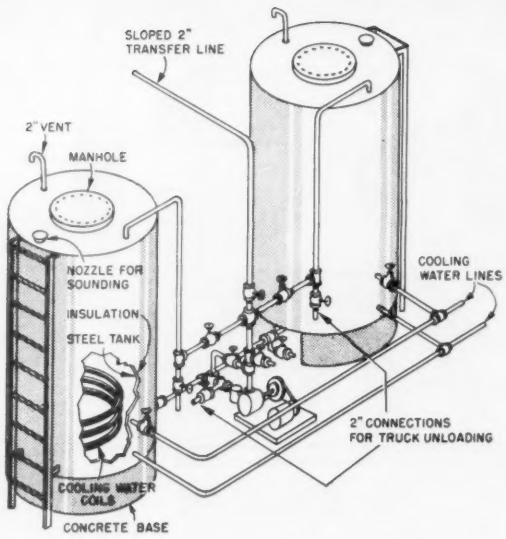
5766 Trumbull Ave., Detroit, Michigan

Circle 637 on Inquiry Card—Page 51

Bulk Storage and Handling of

LIQUID CORE BINDERS

By T. P. SHUMAKER
General Sales Manager
Southern Division
Reichhold Chemicals, Inc.
Tuscaloosa, Ala.



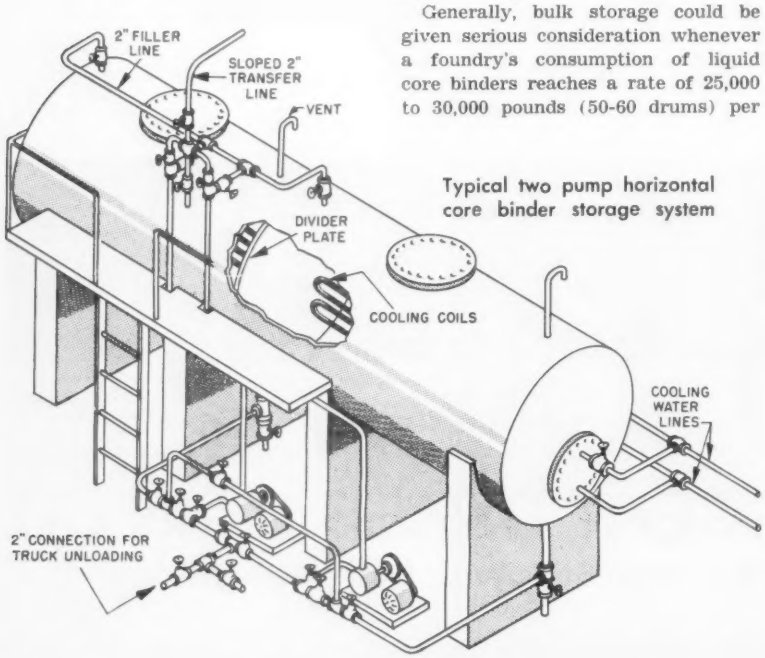
Typical construction of vertical tank storage system for synthetic core binders

COST-CONSCIOUS foundry managers are studying the economics of handling their core binders in bulk instead of in drums. Aside from an important price differential between bulk and drum quantities, there are additional advantages in materials handling, saving in valuable storage area, and in plant housekeeping.

Economically, the differential in cost of bulk and drum purchases of binders, whether resinous or oil types, will pay the cost of investment in bulk handling equipment. Depending on rate of consumption of core binders and cost of installing bulk handling facilities, the entire investment may be amortized in as little as a year.

TABLE I—Viscosity-Temperature Relationship of Core Binders

Temperature in Degrees F	Urea-Formaldehyde Water Soluble	Amine-Aldehyde Water Soluble	Phenol Formaldehyde Water Soluble	Core Oil
	Viscosity in Poises			
25°	6.75	14.64	9.00	5.35
30°	6.55	10.35	6.58	3.05
35°	5.45	8.85	5.35	2.60
40°	4.27	7.75	4.27	1.85
45°	3.52	6.84	3.50	1.48
50°	2.81	6.72	2.75	1.18
55°	2.40	6.25	2.23	1.02
60°	2.05	5.80	1.82	0.83
65°	1.75	5.60	1.50	0.72
70°	1.52	5.35	1.28	0.67
75°	1.38	5.05	1.05	0.58
80°	1.15	4.78	0.92	0.52
85°	0.95	4.55	0.73	0.36
90°	0.80	4.40	0.60	0.34
100°	0.65	4.15	0.52	0.32
120°	0.46	2.85	0.28	0.30



Typical two pump horizontal core binder storage system

Generally, bulk storage could be given serious consideration whenever a foundry's consumption of liquid core binders reaches a rate of 25,000 to 30,000 pounds (50-60 drums) per month, and it becomes increasingly attractive as the consumption rate goes up.

Two Considerations—Two important factors will generally determine the approximate size of the installation needed: 1. The quantity of a bulk shipment of binder that is regularly obtainable. 2. The rate of consumption compared with the time required to receive a shipment of bulk binder after placing orders.

One important phenomenon which has had an effect on these considerations has been the increasing amounts and types of materials handled by tank truck. The size of tank truck bulk shipments is established by local or state regulations on permissible load limits, but generally fall between 25,000 and 40,000 pounds (50-80 drums). These modern tank truck carriers are usually, but not always, equipped with their own unloading pumps, and all that is required is for the unloading line to be fastened to a line to the storage tank.

A factor which must be considered is that these common carriers can-

Produce large cores fast and economically

• Does your labor cost run high in the production of large complicated cores? You can cut this cost by using new RCI COROVIT® 7202 binder. This material serves as the *sole binder* with dry sand. It produces an extremely dense, hard core that *bakes fast with a minimum of gas evolution. Collapsibility is rapid.*

RCI COROVIT 7202 is sold with a non-toxic, non-staining accelerator which gives you excellent control over the self-curing rate. This material is identified as COROVIT 7200-A.

4 reasons why COROVIT speeds baking:

1. Part of the cure takes place at room temperature.
2. Extremely fast baking ingredients are "prebaked" during manufacture.
3. No moisture is present in the sand mixture.
4. The usual pitch-like thermoplastic binders for large cores are not needed in COROVIT-sand mixture.

Get all these advantages with RCI Corovit® 7202

1. Reduce core making time and labor — only one binder needed... superior rammability of mixture means less arboring and wiring.

2. Add only one accelerator — it's safe ...non-toxic and non-staining... no dermatitis hazard with binder or accelerator.

3. Speed baking — with no need for bedding sand, frames or dryers during baking cycle.

4. Avoid core distortion — no sagging during transportation.

5. Improve collapsibility — lack of pitchy ingredients usually required for hot strength and clay substance needed for green strength makes for easy shakeout... also inhibits hot casting cracks.

SPECIFICATIONS

COROVIT 7202 binder

Viscosity (Gardner-Holdt—77°F.) ..Z_2—Z_4
Lbs/gallon (77°F.).....7.8—7.9
Percent non-volatile.....99—100

COROVIT 7200-A accelerator

Non-toxic, white, fine mesh powder

* * *

If you would like full information on using this important new core binder, write to RCI for COROVIT BULLETIN F-11R.

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REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

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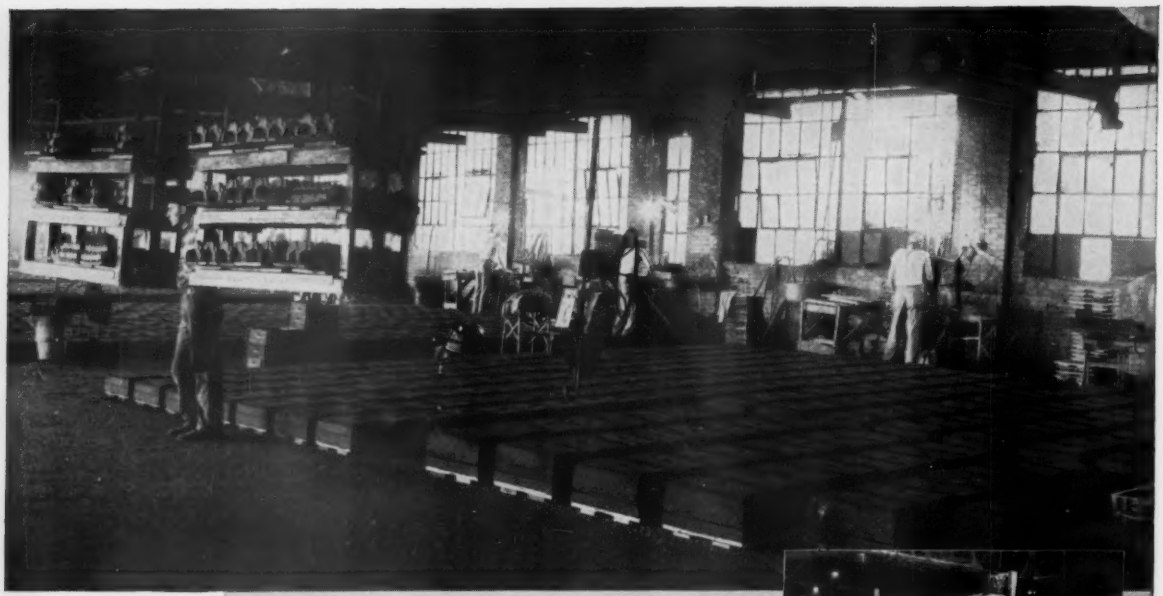

Knight services include:

Foundry Engineering
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Methods
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Complete

Modernization Program

Amortized in *Less* than a year through savings in unit labor costs

A complete operational analysis of this plant was made by experienced Knight engineers. Their survey proved that modernization, rather than complete mechanization, would increase production per man hour, establish an equitable rate structure, and eliminate overtime which amounted to 5% of existing labor costs.

The modernization program, based on the relocation of equipment, motorization, and improved methods, has been carried out. In addition to achieving the objectives above, it has also resulted in improved quality control which reduced scrap waste by 50%.

This plant is a good place to work.

Whatever your industrial problem, you will benefit by the experience of Knight engineers. For prompt attention, call our Chicago or New York office.

EVIDENCE OF EXPERIENCE

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not perform the unloading job beyond attaching their lines to the unloading station at the foundry. Also, since equipment and driver time are valuable, arrival of tank truck shipments must be carefully scheduled to permit their rapid unloading and release.

Rail tank cars, also, are available in sizes ranging from 4000 gallons to 10,000 gallons, or approximately 40,000 to 100,000 pounds of core binder per shipment.

Some of the factors which would be given consideration in deciding on arrangement for a bulk storage system are:

Location and Protection of Tank—Each foundry will have its individual problem of selecting the best site for a storage tank. The most nearly ideal situation would be to have it (1) located at a point near enough to the rail siding that tank cars might be unloaded easily, (2) access to the tank by road, so that tank truck deliveries can be made, and

TABLE II—Freezing Point Ranges of Typical Synthetic Resin Core Binders

Type	Freezing Range
Liquid phenol-formaldehyde (Aqueous Solvent)	20-24° F
Urea-formaldehyde (Aqueous Solution)	19-25° F
Amine-aldehyde (Aqueous Solution)	19-23° F

Note: Core oils have freezing points well below zero Fahrenheit.

(3) close enough to the coremaking department to keep down length of transfer line from the storage tank.

Since the core binders being stored must be protected from extremes of temperature, both hot and cold, the storage tank either should be located in a building or underground or, if outside, provided with proper insulation and weather protection.

There are two reasons for wanting to protect the storage tank from temperature extremes. First, the viscosity of binders will increase quite rapidly as they become cold and will place a greater burden on the pumps. Resin binders, particularly, have freezing point ranges which, although lower than water, must be considered in winter storage.

Table 1 indicates the typical viscosity behavior of resin core binders and core oils, over a range of temperature from 25 to 120°F.

Table 2 gives the freezing ranges of typical amine-aldehyde and phenol-formaldehyde synthetic core binders. Freezing points of core oils are well below zero.

Tests have shown that synthetic

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Research Transforms Clay Into Important New Refractories

Illinois Clay research makes possible new refractory and insulating materials that reduce furnace radiation losses, stop lining deterioration, resist slags and erosive action, provide more than twice the life of conventional fire clay ladle bricks, and provide longer life for cupola linings. For example, within the last year, five completely new refractory products were developed... they are now cutting costs in many industries.

Illinois Clay Products Co. has excellent production facilities and a convenient location. Fast, dependable service can be made by truck or rail in a matter of hours. Write for information on your refractory requirements.

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MANUFACTURERS OF:
GOOSE LAKE Ground Fire Clay, Fire Clay Flour, Grundite Bond Clay, Fire Clay Brick, Firox;
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CHEM-BRIX Silica, Carbon.

ILLINOIS CLAY PRODUCTS CO.

Circle 640 on Inquiry Card—Page 51

Remove more metal faster with powerful Thor air grinders

Thor has introduced 15 new air grinders in the past year, rounding out the industry's most complete line of air grinders—in a wide range of sizes, speeds and wheel capacities. Ask your Thor factory representative for a demonstration. Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

Thor PORTABLE POWER TOOLS

THOR POWER TOOL COMPANY, CHICAGO

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resin core binders, after having been frozen, still make good cores, if carefully thawed. It is usually difficult to thaw out a storage tank or transfer line, however, without local overheating of the resins which would affect their performance.

In general, the best practice is to give resin core binders the same degree of protection from cold that is provided the foundry water supply system.

Protection against high temperatures is particularly important in the storage of synthetic resin core binders. Usually liquid urea-formaldehyde or amine-aldehyde resin solutions will have a storage stability of from four to six months at 75°F, which is more than sufficient for commercial handling. For each 10 degrees that the storage temperature increases, the safe storage life is roughly reduced about in half.

In the accompanying sketches, the installations are shown provided with coils through which refrigerated or cool water may be circulated to provide cooling to the storage tank contents. This would be particularly advisable for some types of phenolic core binders which have excellent performance characteristics, but which must be kept very cold (50-60°F) for them to have practical storage lives.

For protection of a storage tank from high-temperature exposure, insulation and an external protective coating are applied. A typical recommendation for storage tanks in open service in an area where 80 to 125°F daytime temperature maximums are encountered, is to use 1.5 in. of fiberglass insulation, covering this with an insulation sealer and the sealer with an exterior finish. This provides a conductivity factor of 0.225 corresponding to about 93 per cent efficiency over a temperature differential of 80 to 100°F. The insulation sealer is applied at a rate of 50 lb per 14 sq ft of surface, and is topped with an exterior finish applied at 100 lb per 45 sq ft of surface.

Any other equivalent insulation and protective system may be used. The example cited provided a heavy-duty system where cost was not the governing consideration.

Materials of Construction—Foundry core binders do not require stainless steel or glass-clad storage tanks. The most widely recommended material of construction, and the most economical, is mild, or carbon steel. The pipe lines are also of this metal.

Synthetic resins are relatively inert to attack on the storage tank;

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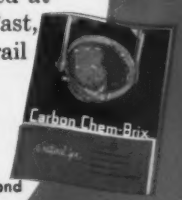

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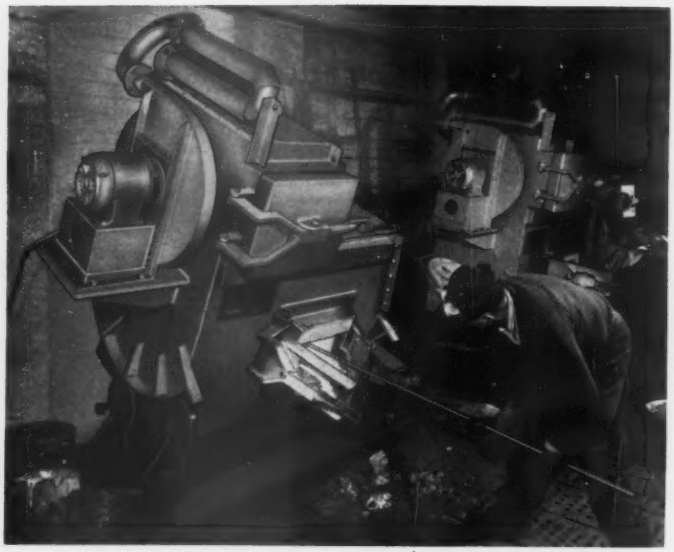

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usually the only place where any appreciable corrosion takes place is in the head space, or area of the tank not covered by the liquid level. In this area there may be sufficient exposure of the tank sides to volatile vapors, moisture or organic acids as to cause some slight amount of discoloration of the resin from dissolved iron. The extent of attack is not generally significant where the tank is protected from high temperatures.

Size and Number of Tanks—Wherever possible, tanks should be in pairs or have a single tank bulkheaded to provide two separate storage units. The most important reason for doing this is to be able to use up the oldest material on hand without the necessity for unloading a fresh shipment on top of the unused part of the older inventory. In using synthetic resins, particularly, where definite storage life must be considered, having two tanks permits completely using up old material.

A second advantage is that where the foundry purchases from two suppliers, a means is provided for keeping the products separated.

The most common size among storage tank installations being considered today is a total of 8000 to 10,000 gallons, divided either as two separate tanks of 4000 to 5000 gallons each, or of a bulkheaded single container divided into two equal compartments. This permits the foundry to receive tank truck shipments, or up to 5000 gallon tank car deliveries.

Recommended arrangements for pumps, lines, and fittings for bulk storage installations will, of necessity, be adapted to each foundry's needs.

As an example, an 8000-gallon installation, where the tank is placed in a horizontal position, as shown in the sketch, can be provided with a bulkhead to give two equal 4000-gallon sections.

This tank, using flat ends, could be 8 ft in diameter by 21 ft 4 in. long. Using ¼-in.-thick mild steel plate, the tank, including the bulkhead, but not including fittings, coils, insulation, etc., would weigh approximately 8400 lb. Total tank area would be approximately 640 sq ft.

The fittings which the tank should have, to cover all eventualities, would be (1) a manhole and cover large enough to permit access for inspection and cleaning, (2) a vent for air displacement during filling and emptying, (3) a drain located so as to completely drain the vessel, (4)

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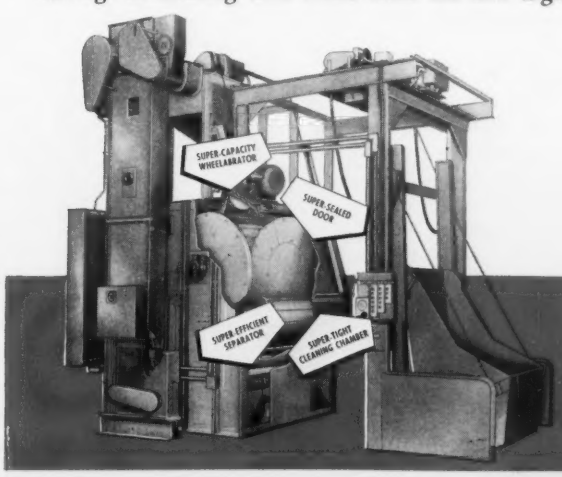

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other lines as are required for measuring, transfer, etc.

Other fittings would include a sounding port or small opening to permit dipping the tank for measurement, without opening the manhole. This would be optional, as the manhole (hinged and equipped with bolts) would permit sounding and measurement.

The tank, if installed in a horizontal position, should be inclined slightly toward the discharge end, so that it may be fully drained. The discharge opening from the tank would go to the suction side of the pump.

The piping arrangement is engineered for flexibility and convenience. The line from the pump to the coreroom would be inclined so that, when desired, it could be drained back into the tank to avoid its overheating and plugging.

Storage tanks always are fitted with drain lines, as invariably at some time during their service it will be necessary to clean them and to drain them completely. Arranging the piping so that the pump can also be used to transfer from an external source to the storage, sets the arrangement up for unloading railroad tank cars, which are not equipped with their own pumps.

For pumping, a positive displacement (gear) pump is commonly used. For this illustration a 3-hp motor and a pump with a capacity of 30 gpm was used. The pump uses asbestos packing, and is equipped with a by-pass and pressure relief valve for its protection.

The pump is also protected from debris by having strainers incorporated in the layout.

Pipe size for most bulk storage installations is 2 in.-diam. Smaller

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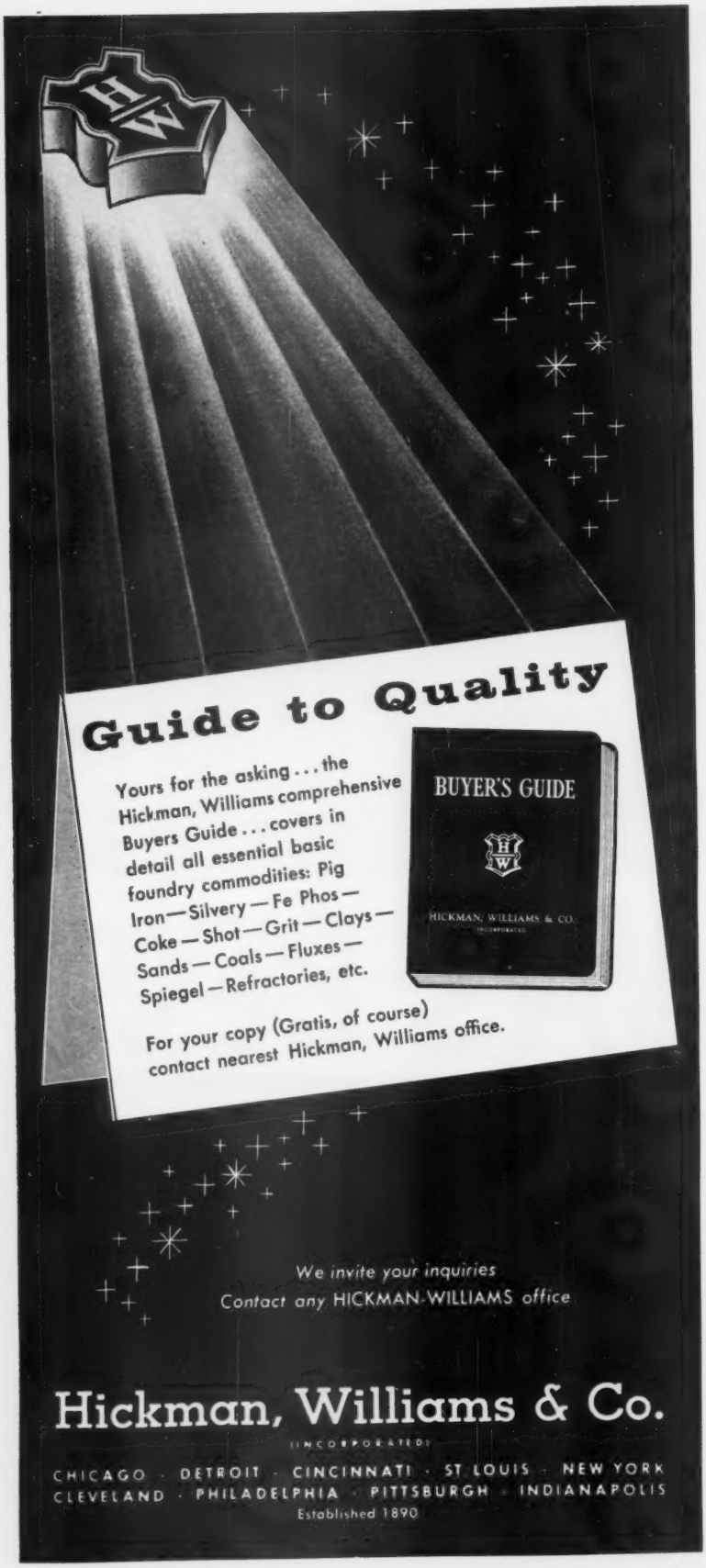
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sizes may be used, but experience has shown the 2-in. size to be the most preferred.

Periodic inspection and maintenance of storage tanks will require cleaning them after they have been in service for some time. For safety reasons, it should be remembered that concentrations of vapors such as formaldehyde may be present in the tank. It should be completely filled with water, drained and inspected for vapor prior to entry. Personnel entering the tank should observe safety precautions for entering vessels as established by foundry management.

To clean tanks which have been in synthetic resin service, normally water or water containing small amounts of sodium sulphite will do a good job of removing residual material. Sodium sulphite is used to react with any formaldehyde remaining.

Since the conditions at each foundry will require modification of any standardized design, these recommendations and sketches can be modified to fit the individual requirements. In many instances great ingenuity has been exercised by foundry personnel in procuring and installing bulk handling systems at surprisingly low costs. As costs vary very widely, no attempt has been made in this discussion to make such estimates.

With the increased interest in bulk storage systems, progressive suppliers of core binders are glad to work with foundry engineers to give the benefit of accumulated knowledge of liquids handling and storage.

GIFS Publishes Manual on Casting Design

Casting design from the designing engineer's viewpoint, covering functional strength, performance, appearance and economy, is the subject of "Design of Gray Iron Castings," published by the Gray Iron Founders' Society Inc. The 46-page manual, co-authored by Arthur Scharf, Battelle Memorial Institute, and Charles F. Walton, technical director of GIFS, brings together pertinent information and data on design and takes advantage of the most recent developments in the castings industry. Intended for inclusion in the society's Gray Iron Castings *Handbook*, the manual is available from iron castings suppliers who are members of the society, or from the Gray Iron Founders' Society, National City-East 6th Bldg., Cleveland 14, at $3 per copy.

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Circle 732 on Inquiry Card→

STILL ANOTHER MALLEABLE FOUNDRY GOES SPEEDMULLOR

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Iowa Malleable at Fairfield, Iowa, that state's only malleable jobbing foundry, has installed a new Model "70A" Speedmullor to prepare all of their synthetic molding sand. The new unit prepares from 275 to 300 tons of synthetic sand in a 6 to 7 hour day to keep 32 molders supplied. Benefits include not only higher production but improved sand quality and far better control over sand properties. The unit, equipped with Speedmullor Cooling, is an important step in this foundry's progress.

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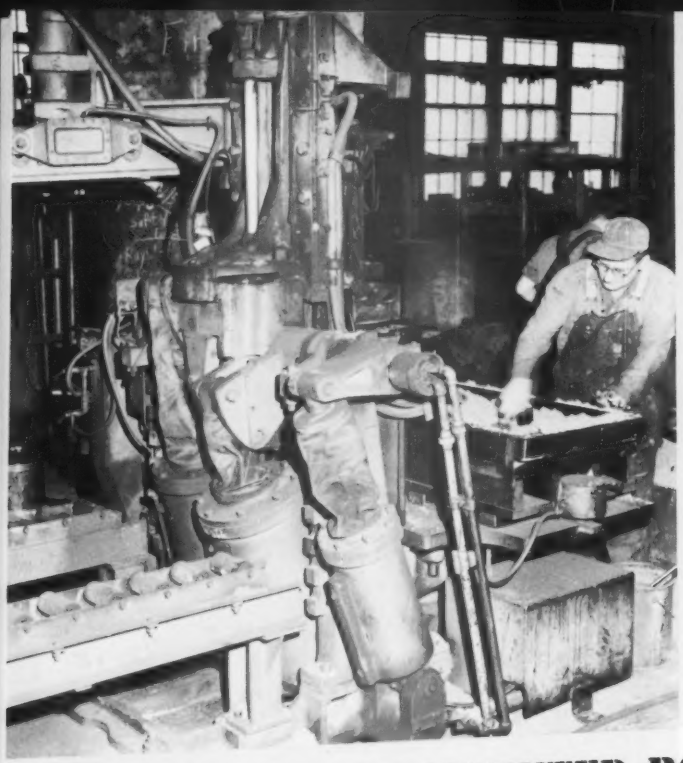

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- ✔ No pits for installation . . . just one of many money-saving features.

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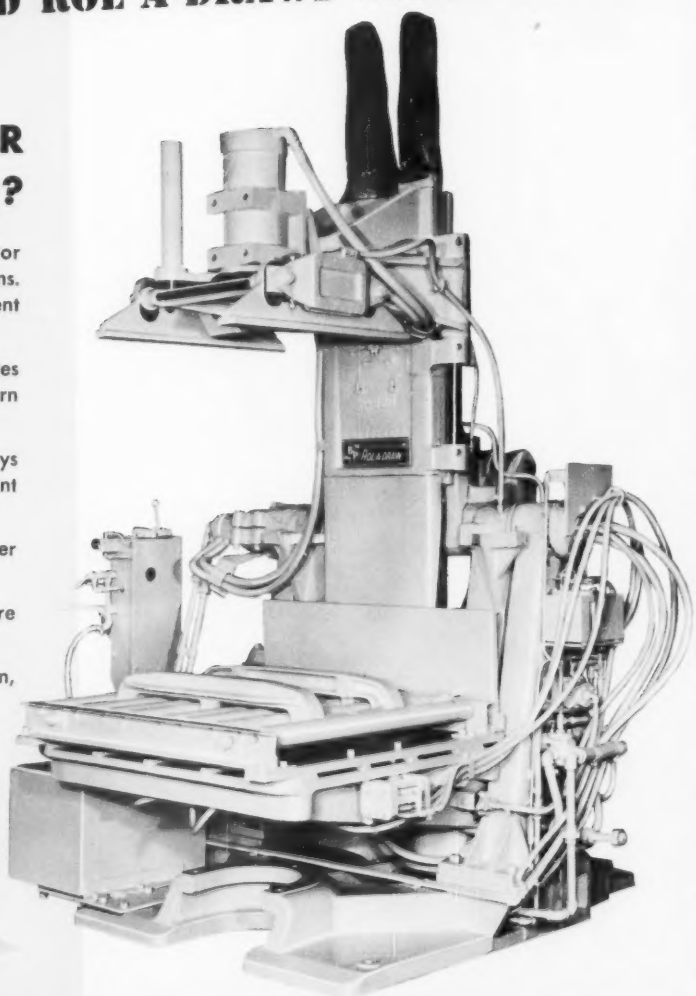

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Frank W. Shipley, president, AFS, left, Kurt F. Wendt, dean, College of Engineering, University of Wisconsin, center, and Prof. George F. Barker, president, Wisconsin AFS chapter, get reacquainted and hold an informal discussion during a luncheon session

WISCONSIN CONFERENCE

Studies Production of Castings

By EDWIN BREMER, *Metallurgical Editor*, KENNETH L. MOUNTAIN, *Associate Editor* and ERLE F. ROSS, *Chicago Editor*

THE twentieth in the long series of successful regional foundry conferences was co-sponsored in Milwaukee, Feb. 14-15, by the Wisconsin Chapter, AFS, and the University of Wisconsin at Hotel Schroeder. Attendance equaled the 775 record established the year before.

Constituting the program were two general sessions, 20 technical sessions, two luncheons and a banquet. Simultaneous sessions during four periods covered steel, gray iron, malleable iron and nonferrous foundry practice and patternmaking.

Wisconsin Chapter President, Prof. George J. Barker, College of Engineering, University of Wisconsin, Madison, Wis., opened the conference. He was followed by Kurt F. Wendt, dean, College of Engineering, University of Wisconsin, who spoke on **Engineering, Education and Industry.** Referring to the current shortage of technical manpower, he maintained that this country doesn't need to win the race of quantity with Russia but it does need to win the one of quality.

Pointing out that colleges are graduating far fewer engineers than industry seeks to employ, Dean Wendt emphasized the inequalities in salaries paid to professors and instructors compared with those given to engineering graduates. He warned that if remuneration to educators isn't raised schools will be unable to maintain and expand teaching staffs. The speaker noted a trend in increased emphasis on teaching of basic science.

Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill., and National AFS President, spoke on **Place of the AFS in the Castings Industry.** He paid tribute to the University of Wisconsin and other universities for their cooperation with the foundry industry. He outlined how the AFS through its activities has promoted scientific advancement of its industry and has encouraged the sharing of knowledge and experience. Speculating a bit on what is ahead for the foundry industry, Mr. Shipley said the society must be prepared to lead the way and must demonstrate there is quality and economy to be derived from cast products.

William W. Maloney, general manager, AFS, Des Plaines, Ill., reported national office activities, including plans for the castings exhibit at the annual Convention in Cincinnati, May 6-10. His message was that the society gets its motivation from the fact that foundrymen are not satisfied that today's castings and the methods for making them are the best that can be achieved.

Dr. Ralph E. Lapp, nuclear physicist, gives banquet address

Fume and Dust Control was discussed by Harry E. Gravlin, Detroit,

at the second general session. He pointed out that with time things move from one emphasis area to another. For example, cost accounting is quite different today than when it was first imposed. United States population increases 150 each hour, constantly providing a market that must be satisified with goods and services.

Working conditions are changing too. "Can you ask people to work under the conditions of the past?" he asked. Then turning specifically to the subject of fume and dust control, Mr Gravlin said that a complete air program can not be sold all at once, but management can be made to understand the problem and as time goes along to make changes or alterations in its sytem that are compatible with modern practice.

Charles J. Kersten, Milwaukee, spoke at Thursday's luncheon on **The Political Defeat of Communism,** pointing out that all should be on guard to prevent the advocates of that type of political endeavor to infiltrate into the democratic organizations of this country. With such beginnings and carefully planned maneuvering the party-line adherents gradually work to gain control. Once that is accomplished they step boldly forth to establish ruthlessly the Communistic program. To illustrate the methods employed by that party Mr. Kersten showed a motion picture taken in Latvia showing various events which culminated in pushing that small nation behind the Iron Curtain.

At the conference banquet, Dr. Ralph E. Lapp, director, Nuclear Science Service, talked on **The World of Tomorrow.** He traced the development of the atom bomb from its earliest stages to its use as a devastating weapon of war at Hiroshima and Nagasaki to conclude World Ward II. He elaborated upon the unbelievable implications of atomic war weapons presently available and suggested that we turn our nuclear efforts toward peaceful and constructive ends. A great, yet undreamed of, golden era lies ahead if man makes wise use of nuclear energy, he said. Some progress in controlling nuclear power has been made with the submarine Nautilus. Further progress is being slowed by problems of heat conversion but these will be overcome by development of so-called "miracle" metals.

Edward McFaul, Chicago, spoke at the Friday luncheon on **How To Keep Your Foot Out of Your Mouth.** Presentation was predominately in the humorous vein, but interwoven throughout was a serious message illustrating the importance of good communications in human relations, business-wise as well as socially.

At the opening session on steel castings, Jack B. Caine, Wyoming, O., indicated that two bugaboos appear to be sand inclusions and poor dimensional tolerances. Limiting his discussion to jolt-squeeze operations on castings up to 200 lb, he pointed out that the difficulties could be overcome by suitable compaction of sand on the vertical surfaces of the mold. Investigations show that green sand hardness over 75 on the vertical walls prevents washing, erosion and movement of the wall. To accomplish that jolt machines with sufficient stroke and power with flowable sand and heavy flasks are required. Additionally, suitable gating to prevent turbulence as well as controlled pouring with the lip of the ladle as close to the sprue as possible are needed.

What **Spectrographic Analysis** is and how it can be used in the foundry was the subject presented by L. O. Eikrem, engineer, Baird Associates, Cambridge, Mass., beforo the second steel session. It is a graphical chemical analysis method which for metals and alloys provides results in approximately 3½ minutes and with an accuracy of 1 per cent. Even where element ranges are low, it is better than wet chemistry. The procedure is not used for determining carbon—other methods giving more accuracy.

The spectrograph measures radiant energy by its wave lengths. Each metal has its own wave length with little overlap with other metals. Excitation of the specimen is accomplished by electric spark. Heart of the spectrograph, Mr. Eikrem explained, is a diffraction grating. The method, he said, is like taking a finger print of the elements that happen to be present in the specimen.

In discussing **Air Placement of Refractories,** J. E. O'Reilly, Harbison-Walker Refractories Co., said that some practice was required to obtain the desired results with dry-gun mixtures in electric furnace steel operations. For basic linings magnesite passing 28-mesh size with 15 per cent clay maximum is being employed successfully while for acid lining, ganister somewhat coarser than magnesite with 10 per cent clay maximum is used. Present day practice of manufacturers of lining refractories is to ship the materials in slightly dampened condition to facilitate better wetting in the gun or nozzle. If the material is dry, it should be moistened with 2 per cent water before placing in the gun chamber. Proper density of applied patching is obtained by a moisture content sufficient to make the patch stick tightly. Gun should be held perpendicular to the surface and moved back and forth so the refractory is placed in thin layers. Where furnace walls are hot, pre-

Charles J. Kersten, Milwaukee attorney, left, gave a luncheon talk. Left to right at rear are N. N. Amrhein, L. J. Woehlke and L. J. Andres, all members of the Wisconsin chapter and chairmen of conference committees. Photos courtesy Bob De Broux, Milwaukee Chaplet & Supply Co.

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watering or fogging with fine water spray aids in reducing the temperature and prevents too rapid absorption of water from the refractory mix which causes lack of adherence. Rebound of material during application is controlled by adjusting the air pressure.

At the final steel session, A. F. Holden, A. F. Holden Co., spoke on **Sodium Hydride and Other Salt Bath Descaling of Steel Castings.** He showed slides and a variety of equipment installations and described procedures being used in cleaning iron and steel castings with hot salt bath descaling solutions. Systems can be mechanized and made automatic where volume warrants. Removal of sand and oxides from castings prior to machining was said to extend tool life and eliminate sand from machine tool coolant systems. Drainage problems in removing castings from tanks can be solved by cored holes in noncritical areas of castings.

The lead-off speaker at the first gray iron session was W. Edens, research supervisor, Allis-Chalmers Mfg. Co., on the topic, **Nodular Iron.** Mr. Edens discussed a newly developed process for making nodular iron that uses a mixture of sodium and magnesium chlorides with calcium silicide. These materials are added to low sulphur melted in a basic cupola. Additions can be made at the spout or in the ladle. The iron is said to be machined easily in the as-cast state and to have a minimum elongation of 10 per cent in 2 in.

There is no violent reaction between the agents and molten metal when additions are made. Castings made with the new nodulizer do not require heat treatment although some are stress relieved for dimensional conditions. Initial experiments were made in a 36-in, basic-lined cupola but a 54-in. cupola has been brought into use recently because of the success Allis-Chalmers is having with the metal.

At the second gray iron meeting, Arthur Lindgren, Magnaflux Corp., spoke on **Magnetic Particle Inspection As It Applies to Gray Iron Castings.** The speaker showed some slides illustrating in-use applications of nondestructive testing equipment in gray iron foundries. He commented briefly upon available inspection equipment and the techniques required by each type of equipment to aid the foundryman in making sound castings that will be easy to pour, contain minimum metal, be salable and serviceable.

R. J. Aylward and J. Goudzwaard,

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secretary and metallurgist, respectively, Neenah Foundry Co., Neenah, Wis., found the third gray iron session much interested in their description of a **Water-Cooled Cupola.** The operation involves internal cooling using independent water jackets or glands in the melting zone. Reason for cooling was to permit a single cupola to operate through two shifts requiring from 200 to 250 tons in 17 to 19 hours of melting from a No. 8 cupola.

Water-jacket cooling was adopted because total cost was less than $4000; installation could be made over a weekend at no production loss; and daily water consumption 60 to 80 gpm costs only about $8. This cooling water has further use in flushing slag from the front slagging spout and also in the emission collectors on top of the stack. The cupola is similar to any other normal acid cupola except that a 350 to 400°F hot blast is used.

The initial installation of jackets was directly against the cupola shell and was not too successful because it required 6 to 7 in. of blown refractory to reach the normal melting zone. Also the burnout between the top tuyere plate and bottom of the jackets was severe and troublesome. Subsequently the jackets were moved inward 4½ in., reducing the blown-in refractory necessary to 1 to 2 in. This changed the nature of the operation considerably because melting was on a water-cooled surface through most of the heat.

The speakers reported a serious silicon loss through the last half of the heat and experiencing of some so-called "secondary melting zones" along the top of the jackets. Slag analysis during this period showed very high oxidation causing the silicon loss. This oxidation problem was overcome by setting limits on blast volume from 8000 cfm minimum to 9000 cfm maximum. Tuyere ratio also was reduced to 12.0 per cent. Net effect of these changes was to produce a more uniform and deeper blast penetration. After these changes, analysis leveled off throughout the heat and severe silicon loss was eliminated.

At the concluding session on gray iron, K. MacKay Smith spoke on **Quality Control.** He pointed out that the majority of the foundries are set up to produce certain types of castings and a suitable quality control program can be established on an average job system. Each job in production is assumed to be an average job with a limit of

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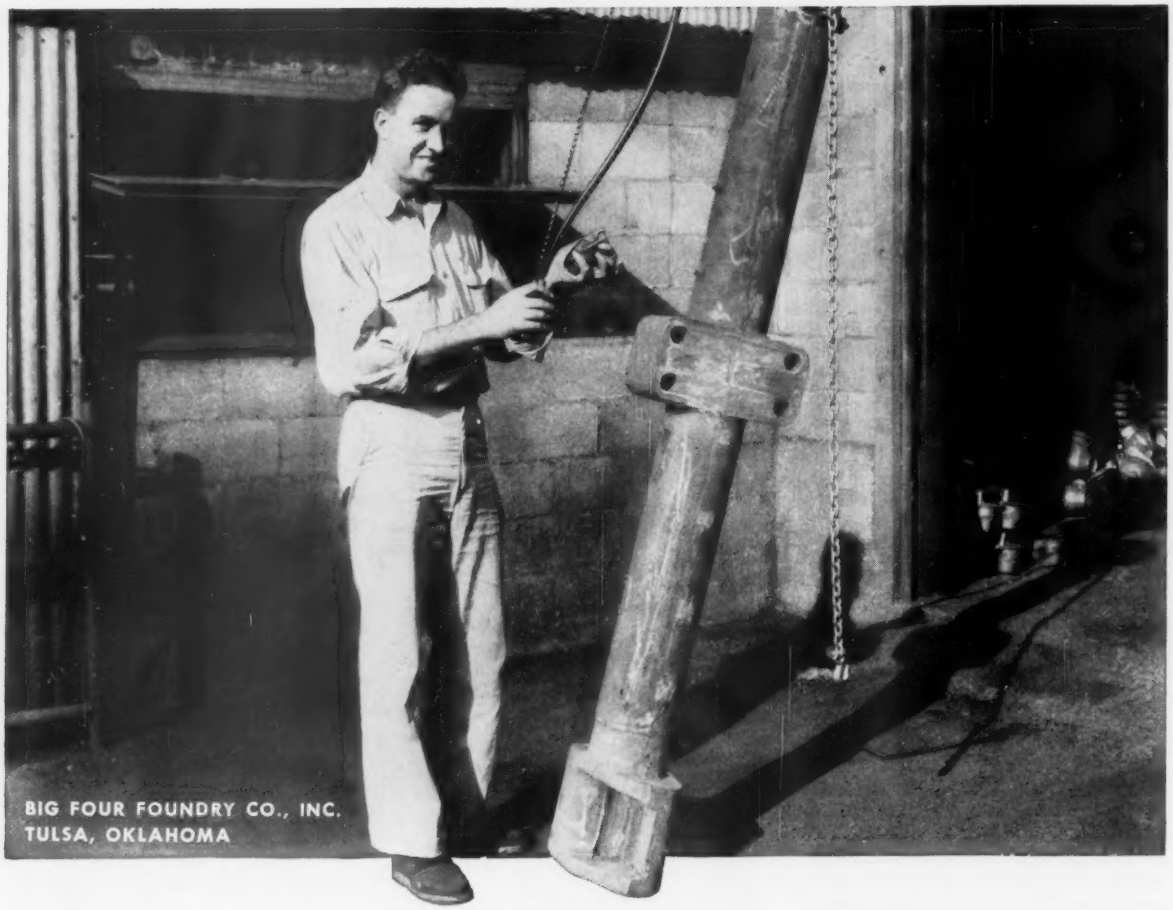

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Typical of Huge Castings made at Big Four Foundry is this one getting finishing touches. Cores for every pattern and every size of casting are made with Cities Service Delco #934 Core Oil. Big Four bakes 5-lb. cores on same racks with those weighing 500 lbs.

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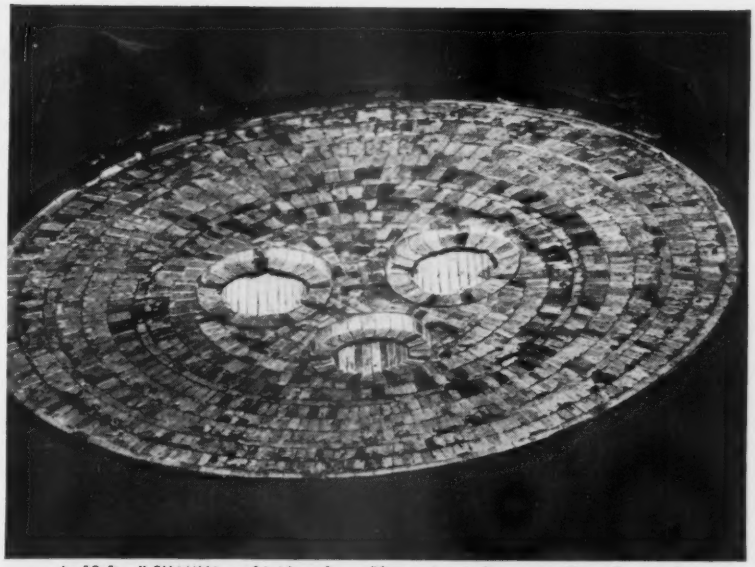
normal variation in scrap. Limit is established by one probability formula and varies according to the historical average of all jobs and the production figure of the particular job. Details relating to the method, application and results are presented on page 123 of the March issue of FOUNDRY.

Joe Orloff, superintendent of foundry and melting operations, Saginaw Malleable Iron Plant, Central Foundry Division, General Motors Corp., led off the malleable sessions with a talk on **Pouring Effect on Scrap.** He detailed his company's investigations and experiences in determining the correct pouring rate and the effect of pouring rate on the casting. Results as affected by sprue cups, sprue post diameter, sprue post length, runner area, runner chokes, skim cores and ladle height were reported. Pouring guide bars are used on all pouring operations today and ladles with 12 in. spouts are held within 2 to 3 in. of the mold. This practice is considered one of the major reasons for company's ability to minimize casting scrap.

Gating and Feeding of Malleable Castings was the subject of Robert P. Schauss, Chicago sales manager, Werner G. Smith Inc., at the second malleable meeting. Ideas were presented to show how increased yield can be obtained if closer attention is paid to pattern layout, downsprue size, pouring basins, runner dimensions and slag traps. The theory of metal solidification was presented and slides shown to illustrate the mechanics of solidification under various mold conditions. Methods of developing a sound casting were outlined and the economics and practical use of live vs. dead feeders was covered.

Addressing the third malleable session, Harrison Weaver Jr., director of manufacturing, Brillion Iron Works Inc., Brillion, Wis., discussed **Shell Cores** including equipment, the process and materials. The speaker regards the shell process when used to produce cores as extremely competitive, but in spite of this enviable competitive position, shell coremaking has lagged behind shell molding. Main reason for the lag seems to be that only within the past year could the fouundryman buy production equipment to produce shell cores.

Most shell coremaking equipment now available is designed to produce hollow cores. Three factors dictate inclusion of this feature. First is economy. Shell sand, mixed and ready to use costs three to four



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times as much as a conventional oil sand mixture and use of a hollow core reduces quantity of sand used. Second is creation of gas and venting. The shell mix produces more gas and use of a hollow core insures venting space for the gas. Third is good collapsibility of the core which facilitates sand removal in the shakeout and aids cleaning.

Mr. Weaver listed advantages of shell core use as: Improved core accuracy, improved surface finish, immediate availability of cores, elimination of core driers, elimination of wires, elimination of baking, elimination of core dipping and drying, complex cores made as easily as simple ones by relatively unskilled labor, excellent storage life without deterioration, less indirect labor than that required for dry sand cores and core material costs are less if the core drains well.

Disadvantages of shell core use were listed as: Coreboxes generally are more expensive, coreboxes must be operated hot, box repair and changes are more costly, hollow cores prevent use of Siamese cores and may result in inefficient pattern layout, core material costs are higher if the core is difficult to drain and excessive quantities of gas are produced by solid sections of core when the mold is poured off.

Technical sessions on malleable closed with a discussion on **Hot Cracks and Tears** by Prof. Richard Heine, University of Wisconsin. He pointed out that those do not result from normal contraction, but from other causes, usually in combination. When the metal is at high temperature, it has little strength and consequently very slight restraint causes tearing. Conditions under which cracking and tearing may occur include improper risering which results in shrinkage cracks or creates hot spots which tear easily.

External shrink cracks are caused by the stretching of the skin to follow the metal movement. Lack of mold wall stability is a cause of cracking or tearing as is use of hard, noncollapsing cores. Nonuniform cooling due to design creates stresses which result in tears. Other miscellaneous causes include poor gating, unfavorable temperature gradients, freezing off of the gate, jarring of flasks during solidification and conditions which permit shifts to occur.

First nonferrous session was addressed by E. A. Rich, general sales manager, Wheelabrator Corp., Mishawaka, Ind., on **Cleaning Room Problems and Methods Used in the Cleaning Room.** Mr. Rich discussed blast

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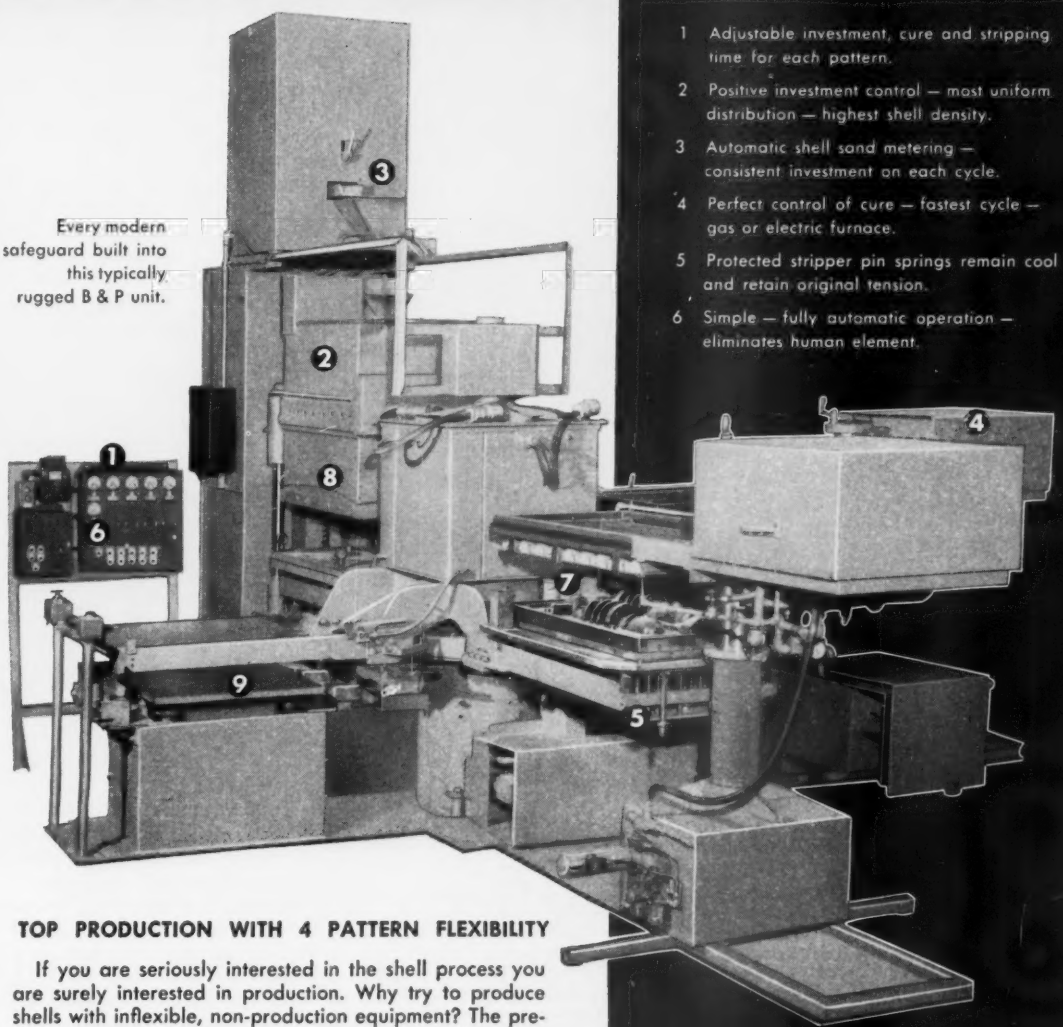

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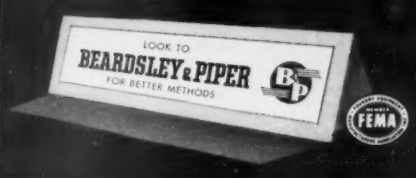

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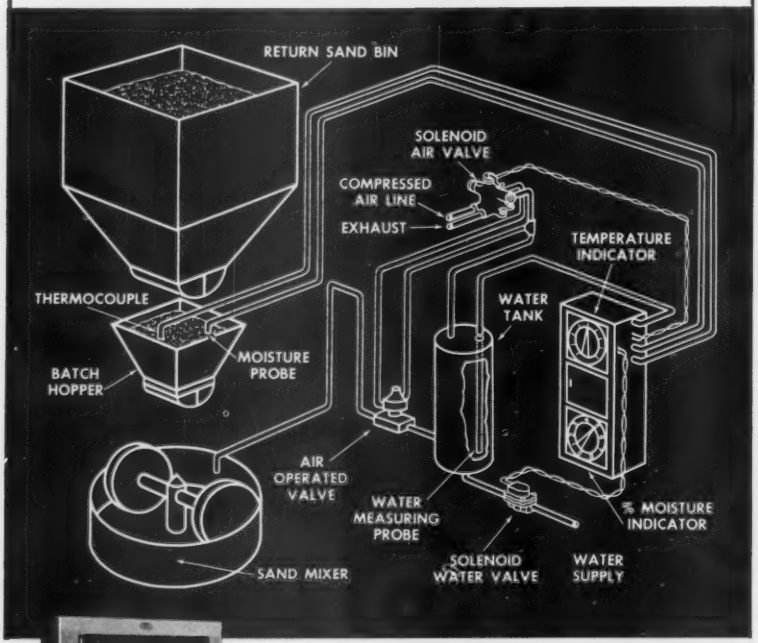

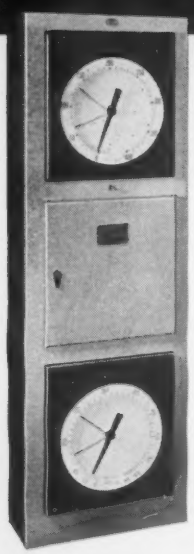

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cleaning equipment, its applications and the types of abrasives employed. Best opportunity the cleaning room has to save money in connection with equipment is in preventive maintenance. Advice was to keep a constant check on the separator which removes contaminants, like sand, from the abrasive. It is becoming more common to make some parts of machines of special materials, where necessary, to reduce wear.

Trends in Modern Copper-base Foundry Alloys according to Dr. George A. Halliwell, H. Kramer & Co., are toward alloys possessing specific properties such as high electrical conductivity, high hardness, high strength, etc., or combinations of those. In that class are the copper-beryllium and copper-chromium-silicon alloys which are termed precipitation hardening alloys since the additive elements form compounds with the copper that remain in solid solution or can be precipitated in varying amounts by suitable heat treatment. By controlling the amount of compound in solid solution, properties may be varied to provide various combinations of conductivity, tensile strength and hardness. Other copper-base alloys touched upon briefly were manganese bronzes, and aluminum bronzes.

Budgeting for Profit was the subject of Urban F. von Rosen, partner, Soloway & von Rosen, Cleveland, and William A. Gluntz, secretary-treasurer, Gluntz Brass & Aluminum Foundry, Cleveland, at the third nonferrous meeting.

Mr. von Rosen discussed the basic principles of budgetary control, use of the budget as the foundation for a sound pricing policy and the effects of volume on cost. He elaborated upon a series of budgeted costing rates prepared recently for a foundry based upon that foundry's production methods, equipment and type of casting produced.

Mr. Gluntz discussed from a practical standpoint the problems that confront the general manager of a nonferrous foundry in the application of budgetary control. He called upon his experience to illustrate how his foundry established burden rates, conversion rates, prices and projected sales volume necessary to realize the anticipated profit ratio.

Final nonferrous session heard R. L. McIlvaine, executive vice president, National Engineering Co., Chicago, discuss **Sand Preparation and Handling for Small Foundries.** The first question foundry management should ask is "Just what are we

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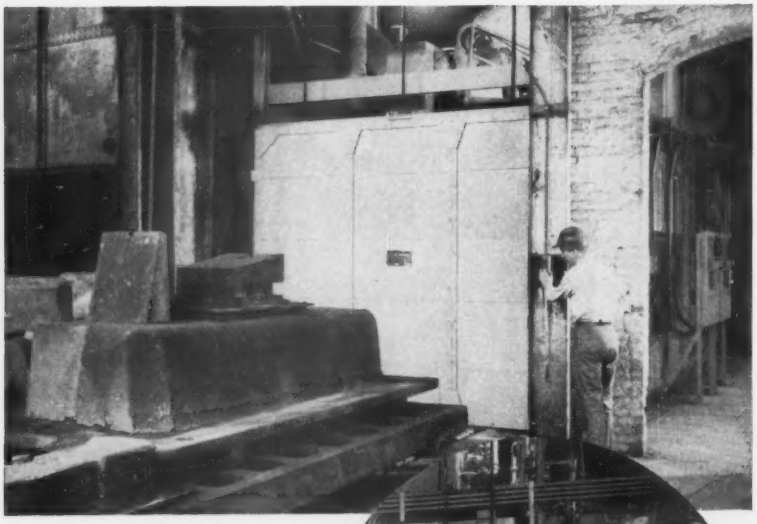

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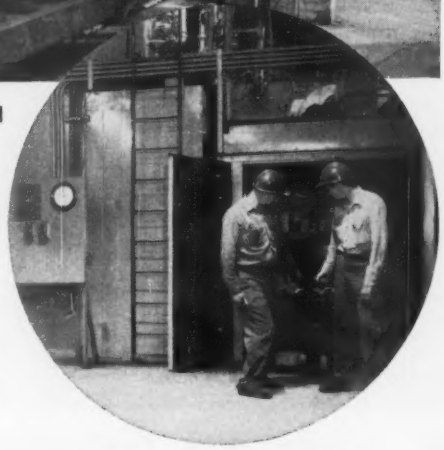

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trying to do?"

Other questions which should be posed are: Are we just trying to get by? Is it part of a plan? Are we trying to cut costs, trying to increase production per square foot, trying to comply with state regulations, trying to save labor, etc.? The point Mr. McIlvaine brought forth was that there must be a reason and a plan before an attempt is made to select sand preparation and handling equipment. And that plan also must take into consideration the amount of money to be spent. The speaker showed sketches of many types of conveyors. He discussed overhead sand handling and emphasized that a large storage bin isn't the answer to cool sand. He described the ways to get sand out of hoppers, and discussed the shakeout at some length.

Cast to Size Cast Iron Patterns was the topic of John E. Stock, John Deere Co., Waterloo, Iowa, at the first session on patterns. Master patterns are mahogany with a 17/64-in. shrink per ft on those 18 in. and under, and ¼-in. per ft shrink on larger patterns. Molding medium for producing cast iron patterns is zircon sand bonded with oil which is applied as a facing at least 1 in. thick and backed up with regular oil-bonded core sand. Zircon mix is composed of 300 lb zircon sand, 2½ lb cereal, 6 lb iron oxide, 2 lb clay, 3½ pints core oil and 3½ pints water. Molds are baked at 350°F for a period of time based on 1 hr per inch of sand depth in the flask. Lightening cores are used to reduce weight, and to provide uniform section thickness with suitable ribs to insure rigidity. While production time for making the cast iron patterns is the same as in conventional practice, use of zircon sand results in remarkable saving in finishing time. In one instance the finishing time was reduced from 382 to 65 hr while in another the time was decreased from 200 to 26 hr.

At the second pattern session, David Kindt, Kindt-Collins Co., Cleveland, discussed **Pattern Research.** To illustrate the importance of research in industry and the length to which it can go, the speaker showed a DuPont color movie on plastics. He then turned his attention to synthetic coatings for patterns, making it clear that the chemist can develop suitable ones to meet required service.

Purpose of a coating, he emphasized, is to protect the pattern. The coating must resist abrasion, heat of the sand and moisture. Lacquer, he

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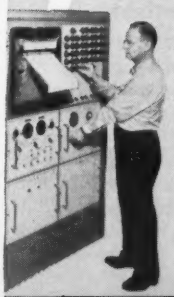

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maintained, meets the service requirements ideally, but only in the last three years has it been catching on, although the research started in 1937.

The speaker talked at some length about plastics and various coatings, stressing how research determines what is the most efficient coating. He mentioned that in many cases the coating can be sprayed on the pattern faster and to better advantage than brushing it on. However, it was admitted that masking of the pattern is required if the spraying method is used.

Third patternmaking session was addressed by William R. Weaver, Modern Pattern & Plastics Inc., Toledo, O. on **Mass Casting Plastic Patterns.** He stated that conventional methods of producing plastic pattern equipment necessitates a type of substructure either in the form of a cast aluminum core or a network of fabricated plastic tubes, metal weldments or wood frames. Patterns produced in that manner show good economic comparisons to metal equipment, but further reductions can be realized by elimination of back-up work. Hence, the desire for a plastic material which could be cast to any desired thickness stimulated development work along that line.

Improve Epoxy Resins

High temperature epoxy resins, capable of being cast in large masses with corresponding increased pot life or handling time, have been developed for mass-cast pattern technique. It now is possible to duplicate patterns as large as 4 ft wide, 6 ft long and 2 in. thick, in a single cast. Control of the process with respect to shrink must be accomplished with pressure at the present time. Relatively inexpensive hydraulic presses are being used currently. Plaster molds reinforced with sisal hemp are adequate to withstand the low (50 to 300 psi) molding pressures.

At the final pattern session, John Nieman, Shell Process Inc., discussed **Pattern Equipment Necessary for Shell Molding.** He started his talk with a brief summary of shell molding and charted its growth since 1950 and elaborated upon several approaches to production as evidenced by the various types of equipment available. Advantages and disadvantages of electrical and gas heating of patterns, pattern construction, pattern techniques, corebox design, venting, ejection, sprue shapes, pouring speeds and coreblowing principles were all covered during the talk or illustrated by colored slides.

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Foundry Developments

By EDWIN BREMER
Metallurgical Editor

NEW hot strength test devised at the Naval Research Laboratory for study of molding sands differs from the conventional isothermal test in that it reproduces in a compression test specimen the thermal gradients that surround a solidifying casting. Described in "Properties of Molding Sands Under Conditions of Gradient Heating" by Howells, Morey and Bishop, which is available from the Office of Technical Services, Department of Commerce, Washington 25, the test for compressive strength versus temperature gives smooth curves showing a continuous decrease instead of the sharp peaks and valleys of the conventional test. Report gives information on tests of various molding and core sands under conditions representing mold interface regions for castings solidifying at 2000 to 2400°F. The report is designated PB 121540 and may be obtained for 50 cents.

Vibration Gets Results

FOLLOWING up some earlier work on "Effect of Vibrations During Solidification on the Mechanical Properties of Castings of Gas-turbine Materials," Jagaciak and Jones in the November 22, 1956, issue of *Foundry Trade Journal* (London, England) report improvement of properties of two alloys with subsonic vibrations. One alloy contained 23 Cr, 11.5 Ni, 3 W, 0.40 Mn, 1.60 Si and 0.20 C while the other was a nickel alloy with 19 to 21 Cr, 2 max Fe, 0.08 to 0.15 C, 0.25 Ti, 0.5 max Cu, 0.4 max Al and 0.015 max Si. Maximum improvements in ultimate strength, impact, elongation, reduction of area and 0.1 per cent proof stress occurred in the first alloy with about 4000 to 5000 vibrations per minute. With the second alloy it was at about 75 to 85 vibrations per second. With vibration large-cored dendrites disappeared from both alloys and were replaced by a finer structure approaching an annealed condition. An increase in density also was observed.

Cracking of Gray Iron

IN A paper "Development of Internal Stresses Leading to Cracking of Grey Iron Castings" presented at the International Foundry Congress held in Duesseldorf, Germany, Angus and Tonks concluded: The mechanism of stress and crack development is similar for all sizes of iron castings examined, and they ranged from ⅛ to 5 in. thick. Cracking stresses essentially are caused by temperature differences and do not start to develop until the hottest member has cooled to 700 to 750°C. Stresses which develop above that range are opposite in direction to the final stresses existing in the cold casting.

Plastic deformation of the hotter member occurs above 700 to 750°C but serves only to insure that when both limbs are cool enough to support stress, a stress-free system exists in which the limbs are at different temperatures. Final stresses develop from this point by differential contraction. Excessive stresses promoted by design of a casting can be minimized by 1) increasing the thickness of the section which cools most rapidly, 2) reducing temperature differences by local cooling, hot knockout, running through thinner sections, etc., 3) raising total carbon content, and 4) lowering phosphorus content.

Intricate Passageways

SMALL, intricately shaped, unlined passageways in aluminum and magnesium-base alloy sand castings are now being formed with a new sheathed-tube core developed by Howard Foundry Co., Chicago. New core is reported to consist of a preformed metal tube sheathed in a flexible refractory. Both tube and sleeve are removed after pouring the casting, the tube being dissolved by a chemical agent and the sleeve removed manually. It is claimed that aluminum and magnesium-base alloys are not affected by the chemical used for disintegrating the tube.

Helps Rolling Along

TRANSLATION from a Russian publication available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, describes research on the development of copper antifriction steels for casting machine parts. Alloys were stabilized during melting and pouring by aluminum additions. Admixtures of lead reduced coefficient of friction and improved machinability, but did not affect good wearability of the copper-aluminum steel. One type of the alloy tested in cast axle bearings and separator rings of ball bearings was recommended to replace brass and bronze. Another type was suggested to replace metal-ceramics parts difficult to produce by powder metallurgy methods. The translation, which is designated PB 121364, contains 50 pages and may be obtained from the Office of Technical Services for 50 cents.

Shakes the Gas Out

REPRODUCIBLE degassing of molten aluminum can be accomplished by ultrasonic activation according to research results reported in "Effect of Ultrasonics on Molten Metals," which may be obtained from the Office of Technical Services, U. S. Department of Commerce, Washington 25. Accelerated degassing of No. 195 aluminum alloy was obtained with a nominal frequency of 15 kc. Greatest degree of acceleration appeared to occur with the ultrasonic energy introduced into the melt by a vertically oriented ultrasonic coupler face. Grain refinement also was accomplished with elastic vibratory energy at the same frequency. Within the energy levels utilized, RC-70 titanium alloy proved a reasonably satisfactory coupler material. Wetting of the coupler face was found essential to deliver elastic vibrations into molten metal at the substantial energy levels which are employed.

Has Good Properties

DEVELOPMENTS of a new high-strength aluminum casting alloy with good ductility is reported by North American Aviation Inc., Los Angeles. Alloy is the magnesium silicide type modified with small additions of beryllium and sodium. It is said to have good corrosion resistance, dimensional stability, reliable response to heat treatment and good radiographic quality. Typical properties in the solution heat-treated and aged condition for sand castings are 46,000 psi tensile strength, 36,000 psi yield and 5 per cent elongation. For permanent mold castings the properties are 50,000 psi tensile strength, 44,000 psi yield strength and 6 per cent elongation.

You Can Satisfy Each One with

NEVILLE PIG IRON

If you're a jobbing foundry man, this picture should look familiar! For it emphasizes the wide range of patterns, sizes and analyses of gray iron castings which you're called upon to produce, day in and day out.

To help you maintain top quality, and meet every order on schedule, Neville not only produces, but *stocks* pig iron in an exceptionally wide variety of analyses. That means we can ship Neville Pig Iron in virtually any analysis and quantity you may need . . . and on schedule!

Neville Pig Iron and Neville Coke for the Foundry Trade

Why not let Neville *quality* and *ready availability* help simplify *your* production problems? We'll be glad to discuss your specific needs . . . and provide you with any technical assistance you may need. *Give us a call today!*

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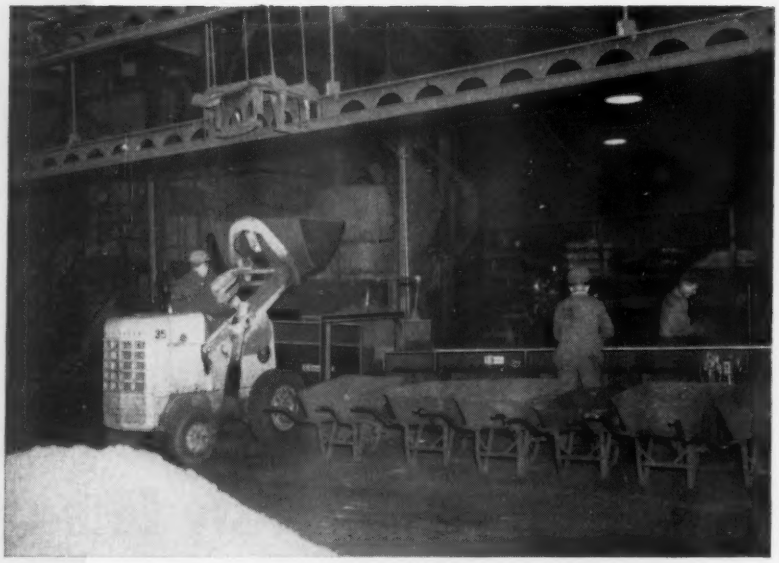
Circle 659 on Inquiry Card—Page 51

OHIO STOVE COMPANY FOUNDRY holds production costs down with SIMPLICITY equipment

At Portsmouth, Ohio, in the modern foundry of the Ohio Stove Co., the SIMPLICITY 4′ x 6′ shakeout and the 30″ x 17′ model VS-12 conveyor (shown here at work) are helping speed operations and reduce unit production costs. First, snap molds are floor dumped; then both castings and sand are scooped and loaded onto the SIMPLICITY shakeout. The castings are then carried on the SIMPLICITY conveyor to the waiting tote boxes. The many plants that are using SIMPLICITY shakeouts are indicative of their foundry-proved superiority. Get complete facts on SIMPLICITY shakeouts, feeders, and conveyors. Write us today.



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Industry Briefs

CANADIAN Car & Foundry Co. Ltd., Montreal, has announced a three-year $15 million plant construction and modernization program. CanCar's plant in suburban Ville St. Pierre is to be enlarged to nearly double its present manufacturing area. Facilities for the production of stainless steel equipment, an extension to the freight car shop, new buildings for the production of freight and passenger car trucks and a three-story administration building are included in the plans.

Austenal Inc., New York, is constructing a new manufacturing plant at Laporte, Ind., to increase its investment casting capacity. To be completed by Sept. 1, 1957, the new facility will consist of a modern, air conditioned two-story office building and a one-story production unit comprising a total area of 85,000 sq ft. Initial operating personnel will number about 300, with a potential increase of up to 700 employees.

Bilt-Rite Iron Works Inc., foundry and machine shop, Marine Street, East Farmingdale, N. Y., has been granted a charter of incorporation listing capital stock of 200 shares of no par value. Directors are James N. MacLean, Edmund C. Burke and John H. House, all of 116 John St., New York 38, N. Y.

Catalytic Combustion Corp., manufacturer of fume elimination equipment and other products, has moved to a new location, the Catalytic Building, 4725 Fourteenth at Grand River, Detroit 8, Mich. Telephone number is Tyler 8-8700.

Shell Equipment Inc., with offices in Bridgeport, Conn., and Connellsville, Pa., has been organized by William J. White and a group of associates. This company will be the sales and service outlet for the Master line of shell molding, shell core, sand preparation, and sand reclaiming equipment manufactured by Ronci Mfg. Co. An agreement has also been made with Cooper-Chapman Co., Toronto, Ont., whereby equipment now manufactured in Canada by that company will be made in the United States by Shell Equipment. Cooper-Chapman will in turn manufacture some of the Master equipment in Canada and act as Canadian sales and service outlet for the entire line.

Through a subsidiary company, Foundry Research and Consulting Service, a complete foundry consulting service will be offered.

Fletcher Foundry Division, Fletcher Works Inc., Philadelphia, has instituted a $100,000 modernization program to speed up production of gray iron foundry molding. To compensate for the scarcity of good molders, the division already has installed a mobile sandslinger, a sand preparation unit, and a new muller.

Reynolds Metals Co., Louisville, has appointed Morris P. Kirk & Son Inc., Los Angeles, to distribute its aluminum pig and ingot products in the entire Pacific Coast region, except southern California.

Kimball's Mineral Supplies Inc., Camden, Tenn., has changed its name to Ward & Sullins Inc. A foundry sand producer and supplier, the company has just completed enlarging and improving its facilities.

Heller Tool Co., Newcomerstown, Ohio, has added three new file lines. The additions include hand and power hack saw blades, metal cutting band saws and flat ground die steel.

Industrial Heating Equipment Association, Washington, D. C., has announced that the backlog of orders for industrial furnaces now is at an all-time peacetime high. As of Dec. 31, 1956, member companies reported a backlog of $110,554,000 of orders, an increase of 42 per cent over the comparable figure for the same date in 1955.

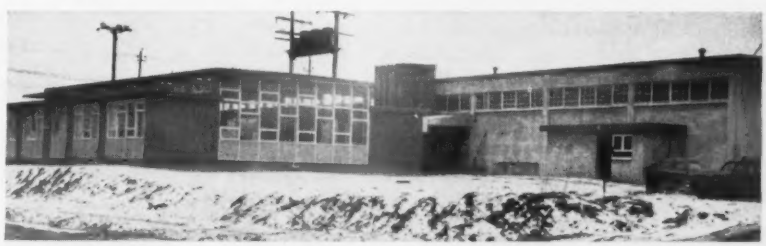
Air Reduction Pacific Co., a division of Air Reduction Co., New York, has begun construction of a multimillion-dollar air separation and liquefaction plant at Bassett, Calif., a few miles from Los Angeles. Daily production at the plant will include 55 tons of high-purity liquid oxygen, 15 tons of liquid nitrogen and 3½ tons of liquid argon. Completion is scheduled for late in the year.

Norton Co., Worcester, Mass., has broken ground for a new $1½ million refractories plant in Worcester. When completed in January, 1958, it will contain 80,000 sq ft of manufacturing space on two floors. The plant will provide completely modern facilities for the straight-line production of heavy refractories for high-temperature applications.

Lectromelt Furnace Division, McGraw-Edison Co., Pittsburgh, has arrived at an agreement to share arc furnace engineering and manufacturing experience with Demag-Electrometallurgie G.m.b.H., Duisburg, Germany.

Jensen Inc. is the new name of the former Jensen Specialties Inc., Detroit manufacturer of industrial ovens and conveyors.

United States Pipe & Foundry Co., Birmingham, has awarded Koppers Co., Pittsburgh, a contract to de-



FINISHING FACILITY: Electric Steel Foundry Co., Portland, Oreg., has constructed this new plant, Esco Ltd., in Vancouver, B. C., Canada. Equipped with blast cleaning, swing and stand grinding, heat treating, and quenching facilities, it currently handles rough castings shipped from ESCO's Portland plant. When the company's new foundry at Port Coquitlam, B. C., is finished later this year, it will supply the rough castings to the plant in Vancouver

sign and erect a battery of 60 coke ovens at its Birmingham operations. The new units will carbonize 1160 net tons of coal per day and will increase U. S. Pipe's coke oven capacity at Birmingham about 30 per cent.

A. P. Green Fire Brick Co., Mexico, Mo., has acquired Remmey Co., Philadelphia. Remmey now is a wholly owned subsidiary of A. P. Green and will operate as a separate corporation with John G. Remmey as vice president and general manager. The name of the firm will be unchanged. Remmey Co. devotes most of its production to the manufacture of special refractories, high-temperature bonding mortar and high alumina refractories.

Railway Wheel Association is the new name of the former Association of Manufacturers of Chilled Car Wheels. Purpose of the change is to include the newly developed cast steel wheels recently adopted by the Association of American Railroads as an approved standard for freight car service.

Automatic Temperature Control Co. is constructing a 74,000 sq-ft manufacturing plant in King of Prussia, Pa. The new structure will provide modern facilities for manufacturing, engineering and research, plus general and administrative offices. ATC produces measuring equipment and control components and combines them into control systems.

North American Refractories Co., Cleveland, has let contracts for the construction of a new research center at Curwensville, Pa. Scheduled for completion in October, 1957, the new center will cost an estimated $300,000. It will be used to co-ordinate all phases of quality control and to develop new products for the company's entire organization.

Link-Belt Co., Chicago, has moved its Louisville district office from 136 South Fourth St. to larger quarters at 235 East Burnett St. The Louisville Link-Belt office serves all of central Kentucky from the Ohio River to Tennessee and four southern Indiana counties near Louisville.

Wheelco Instruments Division, Barber-Colman Co., has established a branch office at 522 East Jefferson St., Springfield, Ill. Changes in other Wheelco branch offices include the following: In Indianapolis, the new address is 1953 Central Ave., Indianapolis 2, Ind.; in Buffalo, 2534 Elmwood Ave., Buffalo 17, N. Y.; in Rock Island, 3710 Fourteenth Ave., Rock Island, Ill.; in St. Louis, 2344 Hampton Ave., St. Louis 10, Mo.

National Research Corp., Cambridge, Mass., and Columbia-Southern Chemical Corp., Pittsburgh, a wholly owned subsidiary of Pittsburgh Plate Glass Co., Pittsburgh, have become associated as equal stockholders in N. R. C. Metals Corp., formerly a wholly owned subsidiary of National Research Corp. N. R. C. Metals Corp. currently has under construction at Santa Rosa County, near Pensacola, Fla., a plant designed for the production of zirconium and hafnium.

American Air Filter Co., Louisville, has established a Pittsburgh branch office under the managership of Charles S. Taddonio. This change was effective with the retirement of J. Duff Reed on Feb. 1, 1957. As in the past, the address of this office is 1002 Highland Bldg., Pittsburgh 6, Pa., and the office will represent only products of AAF's air filter, dust control and engine and compressor departments.

Detroit Gray Iron Foundry Co., Detroit, has purchased Valley Steel Casting Co., Bay City, Mich. In addition to the added capacity acquired by the purchase of Valley Steel Casting, Detroit Gray Iron Foundry Co. is completing a $250,000 expansion program in its Detroit plant which will increase its capacity there by about 20 per cent.

Baker-Raulang Co., Cleveland, has appointed Material Handlers Inc., Charlotte, N. C., to distribute its line of industrial trucks in North Carolina and upper South Carolina.

Yale Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia, has named Cardinal Carryor Co., Louisville, to be its franchise sales and service representative for industrial lift trucks in Evansville, Ind. Cardinal has opened a sales and service center at 1501 W. Franklin St., Evansville, and will handle southwestern Indiana, southeastern Illinois and western Kentucky.

Sonken—Galamba Corp., Kansas City, Kans., has begun operations in a new 15,000 sq-ft plant in Gardena, Calif. The new plant is the company's third and will produce aluminum billet and ingot. The Miami, Fla., plant is in the process of tripling its capacity.

Frederic B. Stevens Inc., Detroit, will handle national distribution of the new Dependable shell core machine. This machine has been added to the Stevens line because of the growing interest of foundrymen in shell cores.

Ferro Corp., Cleveland, will acquire American Clay Forming Co., Tyler, Tex., for about $1 million and will operate it as a subsidiary. American Clay produces a large variety of ceramic clayware used by many industries.

Thor Power Tool Co., Aurora, Ill., has transferred its executive offices from Aurora to the Prudential Building in downtown Chicago, where the company has leased 6000 sq ft of space on the 30th floor.

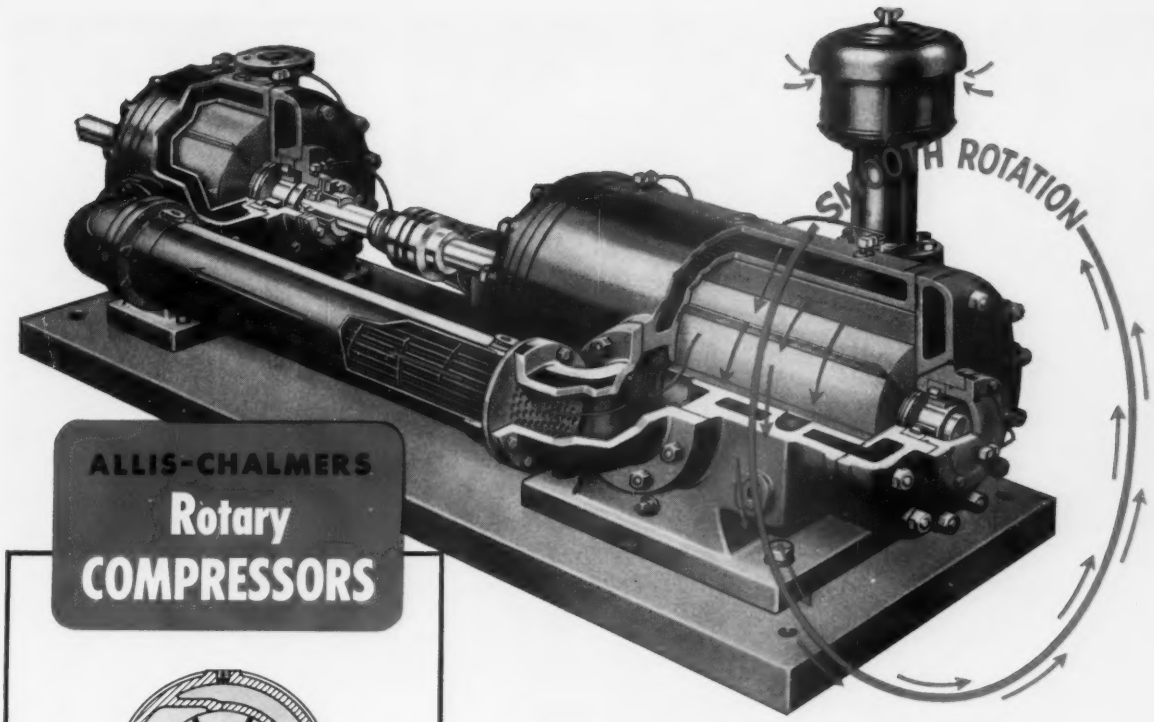
Gardner-Denver Co., Quincy, Ill., has moved its Philadelphia branch office to larger quarters in a specially designed building at 4309-11 Rising Sun Ave. George M. Sitterley is Philadelphia branch manager.

Conco Engineering Works, Mendota, Ill., has appointed Elbert Lively & Co., Newark, N. J., to distribute its line of material handling equipment in metropolitan New York and New Jersey.

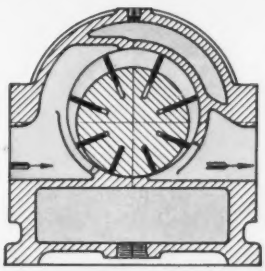
Metal Treating Institute reports total 1956 billings of $37,087,300, or 20.5 per cent more than in 1955. The December, 1956, billing was $2,931,-200, 1.4 per cent more than a year earlier.

Bristol Co., Waterbury, Conn., has opened a new branch factory and warehouse in Houston, Tex. The company already has branches in Chicago and San Francisco.

Enco Ltd. is the new name of Empire Brass Mfg. Co., London, Canada. No other change has been made in the organization.



ALLIS-CHALMERS
Rotary COMPRESSORS



How *Ro-Flo* units operate: Centrifugal force moves vanes to outside wall to form air chamber.

Smooth-running Ro-Flo Compressors cut vibration, and provide...

Constant Efficiency

YEAR after year there is no change in the efficiency of a *Ro-Flo* compressor.

Efficiency always remains uniformly high even if parts wear. Here's the reason:

During operation the sliding vanes of the rotor (see cross section above) press against the cylinder wall to form air cells. Even if these vanes wear, the centrifugal force holds them in contact with the cylinder wall so that the air cell never changes and efficiency and air flow remain constant.

Rotary Means Smooth Operation

Smooth rotation cuts vibration ... eliminates need for heavy foundations. Small *Ro-Flo* units can be bolted directly to the floor. Large units need only a simple slab.

Maintenance is low. There is no wear and tear on compressors from shock and vibration ... no pistons and valves.

A Type and Size for Every Need

Single-stage units for pressures to 50 pounds gauge, and volumes from 42 to 3245 cfm. Two-stage units for 250 to 1800 cfm at pressures from 60 to 125 pounds gauge.

Single and two-stage vacuum pumps for vacuums to 0.3 inch mercury absolute from 22 to 5950 cfm.

GET INFORMATION — Call your nearest A-C office or write for bulletins 16B8244 (2-stage) and 16B8126 (1-stage). Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wis.

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS A-C ALLIS-CHALMERS

A-5134

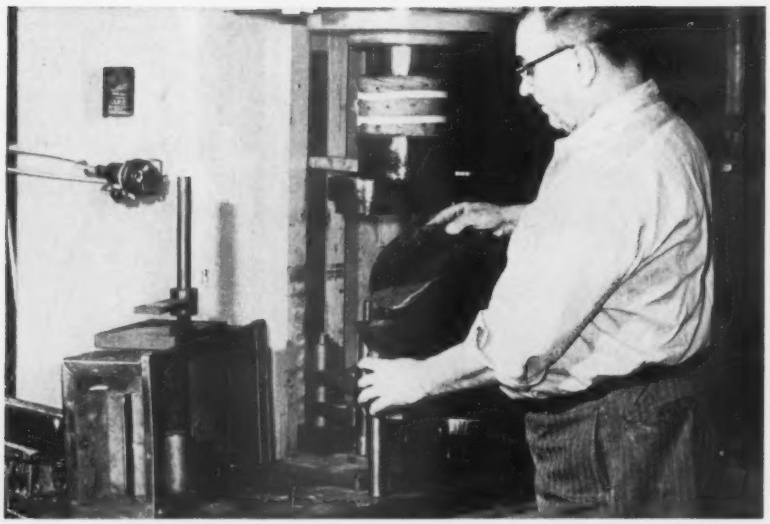


Fig. 1—After the "balancing out" operation at the weighing station, carbon powder is poured into corebox with a steel plug in the bottom

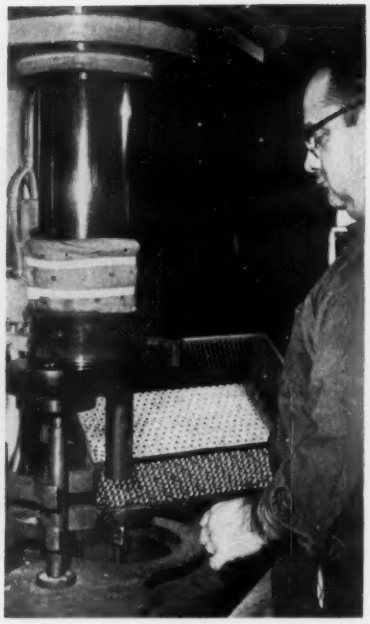


Fig. 2—A plunger is placed in top of corebox and the assembly put in a hydraulic press where carbon is compressed at 300 psi

Hydraulic Press Forms

Carbon Cores For Castings

CLEVITE Corp.'s bearing manufacturing unit, Cleveland Graphite Bronze Co., Cleveland, is using a 25-ton hydraulic press to form soft carbon cores for aircraft bearing castings.

The press, manufactured by the Denison Engineering Division, American Brake Shoe Co., Columbus, Ohio, can turn out up to 100 soft carbon cores an hour. Machining cores to shape, the best alternative manufacturing method, can be done at a maximum rate of only 70-75 an hour. The hydraulic press allows Cleveland Graphite to form its cores from soft carbon, which costs about one-tenth as much as the hard carbon required in a machining operation.

Cleveland Graphite makes bearings

Fig. 3—Core is stripped from the corebox by the same press

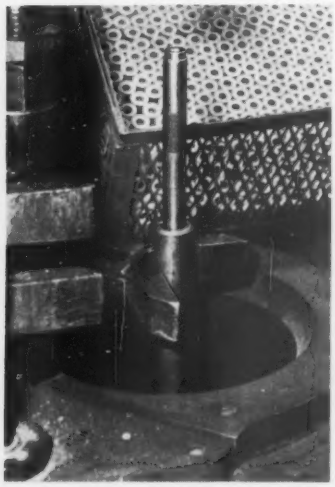


Fig. 4—Operator removes steel plug from the completed core

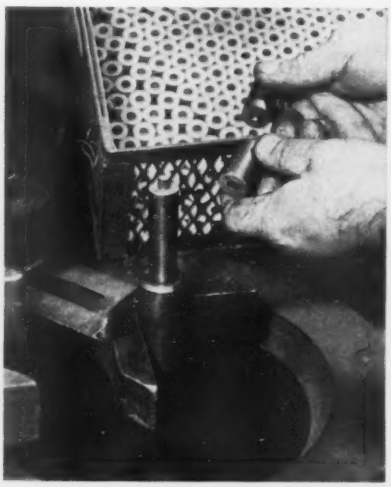


Fig. 5—Safety features are a keynote of hydraulic, automatic 25-ton button-controlled press

A Touch in the foundry does so much

"SMOKELESS, SMOOTH, TOUGH"...

That's what foundrymen call 'dag'® Colloidal Graphite when they're talking about better castings, less finishing time, fewer rejects, and the end of smoke problems. They appreciate the simplicity of mixing 'dag' dispersions with water, and its ease of application. They like the tough protective film of pure graphite that's left on every surface and in every corner . . . a film that resists high temperatures, gives clean parting and smooth-surfaced castings. No carbonaceous deposits, no smoke and less porosity are other advantages of 'dag' dispersions.

An Acheson Service Engineer will be glad to discuss with you the advantages of 'dag' colloidal dispersions in permanent mold casting, centrifugal casting, die casting and other foundry applications. In the meantime, write for Bulletin No. 423 on metal casting and other applications involving high-temperature lubrication. Address your request to Dept. F-4.

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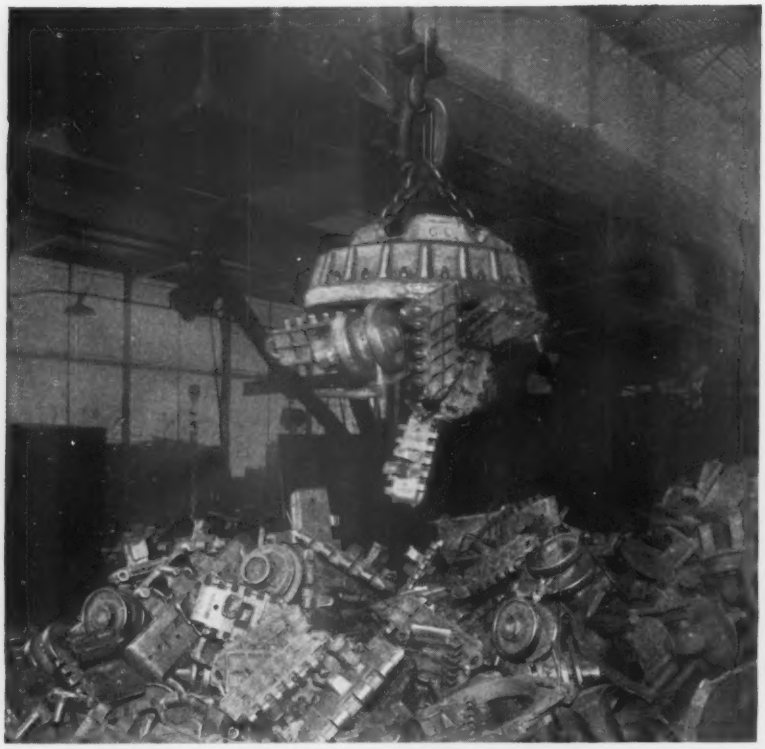
NO STRAPS, NO CLAMPS, NO SLINGS . . .



yet it carries a giant's load with ease

Stearns circular lifting magnets can cut handling costs, increase efficiency in your handling operations. You can lift a heavy casting, swing it overhead and deposit it exactly where you need it — accurately and safely. There's no time lost in fussing with awkward clamps, straps or slings to secure a load.

To pick up a lift, the crane operator moves a control lever and instantly the powerful magnetic force reaches deep into the body of the load, clasps the iron burden and holds it — even though only a small surface area actually contacts the magnet itself during the move.

Once the material is delivered, the operator simply cuts the coil current to de-energize the magnet, immediately releasing the load with perfect control.

Stearns magnets are widely used in foundries for handling square or round castings, odd-shaped castings, scrap iron, pig iron. Besides substantial savings in time and labor, magnetic handling permits better, safer spotting of heavy loads.

Stearns builds both rectangular and circular lifting magnets for practically any application, with capacities to match your requirements. Write today for free literature. Ask for Bulletin 35-CIG.

32

STEARNS MAGNETIC PRODUCTS

635 SOUTH 28TH STREET • MILWAUKEE 46, WISCONSIN

in a wide range of sizes for a number of industries, notably aircraft, automotive and diesel. Aircraft bearings are formed on a pilot plant basis at Plant 3, and the test results are channeled to the company's production plant at McConnelsville, Ohio. Two presses are located at Cleveland Plant No. 3, three at the McConnelsville, Ohio, plant.

Cores formed on the hydraulic press are ¾ to 4¼ in. in diameter, and up to 5 in. long. Soft carbon cannot be readily used for larger diameter cores because larger pieces tend to break down when baked. So hydraulic press production is limited to small, aircraft bearing cores, which require tolerances of 1/64 in.

The carbon cores are used inside the steel casing of a bearing which is to be coated on the inside with

Fig. 6—50-ton hydraulic press removes small core (⅞ x 1¼ in.) from finished aircraft bearing

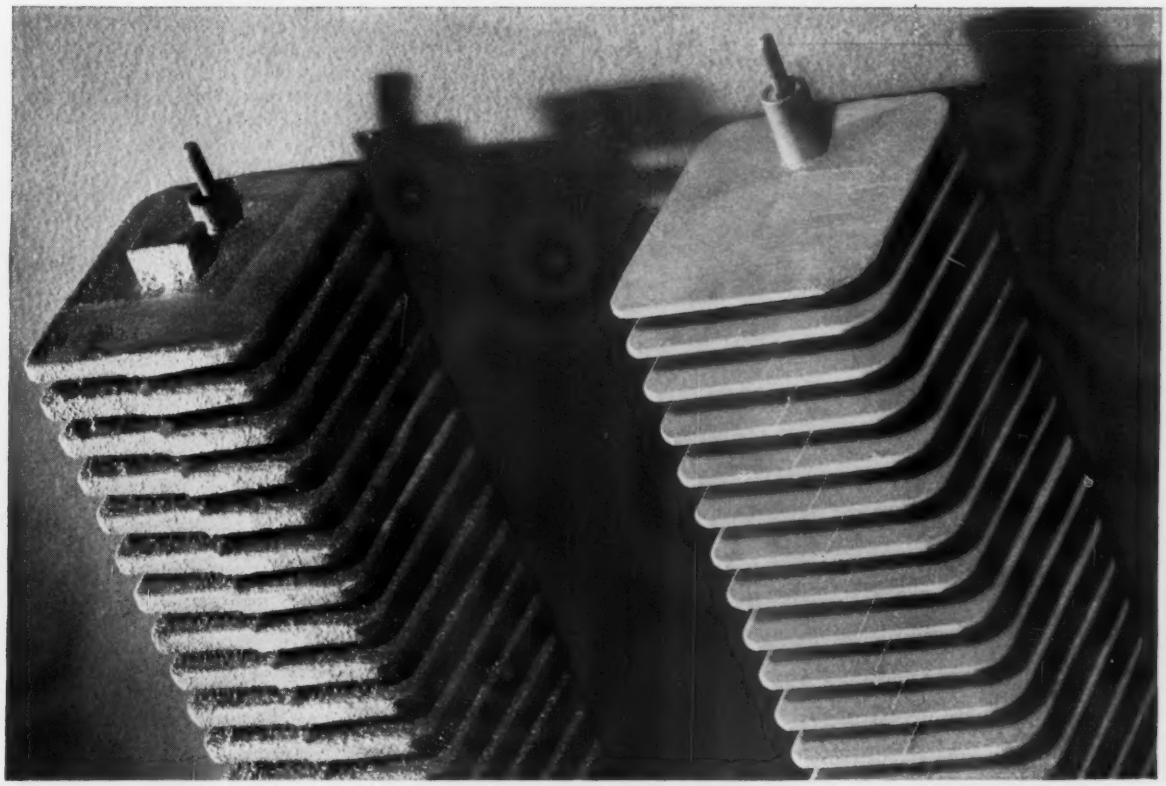
bronze. A cap is attached to each end of the bearing. Rivets hold the carbon core in place inside. The open space remaining inside the bearing is filled with molten bronze.

A six-step process is necessary to form the cores and make them ready for the bronze casting operation. First, the soft carbon ingredients are mixed thoroughly in a hopper and moved to a weighing station adjacent to the press side.

At the weighing station soft carbon is poured into one side of the balance. The other side holds a finished core of the size to be pressed. This "balancing out" operation is necessary because if too much or too little carbon is used to form the core, the piece may crack or "give" in firing.

After weighing, the operator takes a steel casing of the proper diameter, called the corebox, and inserts a steel plug in the bottom. The corebox is filled with the carbon powder

finer castings at lower cost



• **BEFORE:** 44" units cast in core sand cost 25% more to produce than shell molded castings.

• **AFTER:** Simpler foundry operation using Durez resin produces smoother, lighter, more efficient product.

. . . from shell molds bonded with **DUREZ RESINS**

THIS IS ANOTHER EXAMPLE of how quality and economy impossible to obtain with sand casting are achieved through improved shell molding techniques.

The simplified procedure made possible by Durez 18250 coating resin leads to increased production per man hour. Shells and cores bonded with this resin have outstanding hot and cold strength, permitting most economical sand-to-resin ratios. Having a very fast cure this resin speeds up production cycles.

The Lakeside Bronze Co., Buffalo, N.Y. profits also from other advantages of shell molding in producing these Electromode® baseboard heating elements. The shell molded castings have a high quality appearance and are lighter in weight. The end result for the consumer is 15% greater heating efficiency. The pattern-like smoothness of the resultant castings is shown unretouched in the heating units illustrated.

"18250" is one of several Durez resins developed for producing shell molds and cores. Let us send you full information about them. Meanwhile, why not order a trial shipment today, and see for yourself how Durez 18250 cuts costly steps?

• • •

Our "Durez Guide to Resin Coated Sand" is an authoritative 16-page booklet covering simplified procedure, coating methods, solvents, test methods, etc. Ask us for your copy.

DUREZ®

Phenolic Resins that Fit the Job

DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY

1004 WALCK ROAD, NORTH TONAWANDA, N. Y.

HOOKER® CHEMICALS PLASTICS

from the weighing scale (Fig. 1), and a plunger is placed in the top of the corebox. The assembly is then placed in the press and pressure (usually about 300 psi) is applied (Fig. 2). The operator picks up the corebox, removes the plug from the bottom, puts the assembly in the second station of the press, and the carbon core is stripped or pushed from the box (Fig. 3). On a production-line basis one core is being formed while another is being stripped (Fig. 4).

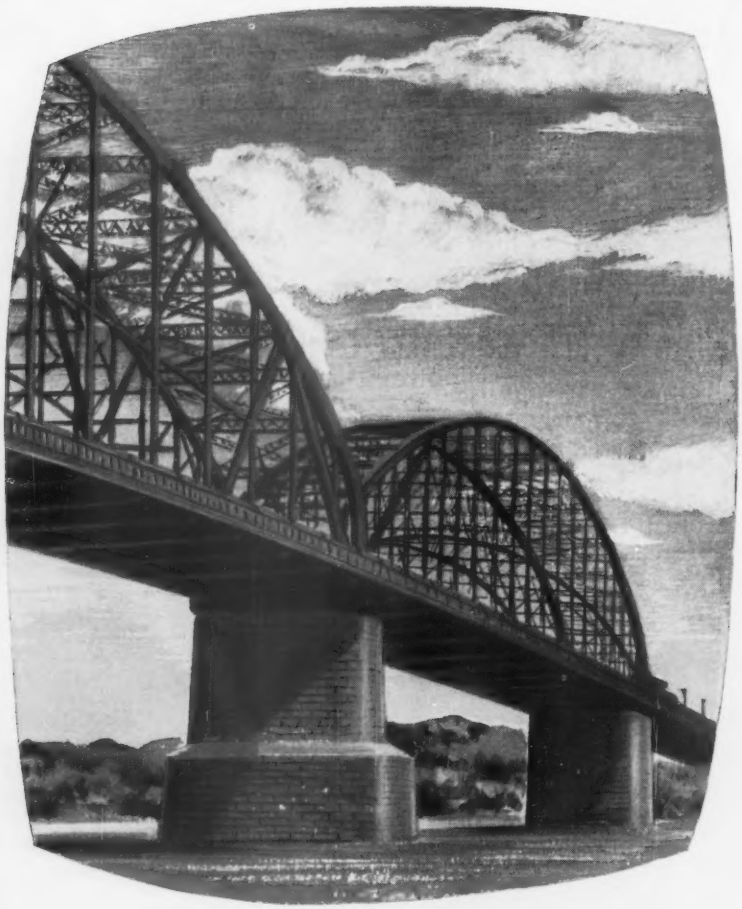
Cores are then put in baskets and allowed to sit at room temperature for 10 hours. Before they can be used for casting, all moisture and impurities must be removed. After 10 hours at room temperature, the cores are baked at 300° F for another 10 hours, which removes the moisture. The cores are next taken to a furnace and fired at 2000° F for 1½ to 2½ hours to remove impurities.

After high-temperature firing, the cores are ready to be locked into position inside the steel shell of the bearing for bronze casting. When this operation has been performed, the locking caps on the bearing are cut off, and the finished casting, still containing its carbon core, is placed in another 50 ton Denison hydraulic press (Fig. 5), and the carbon core is stripped from the bearing. The bearings are then sent to another plant area for machining to final tolerances.

The safety features (Fig. 6) of these presses provide a twofold benefit. First the operator may control through four direct devices his machine's safety operations; a foot pedal operated by the right foot will automatically reverse the ram; a right knee push button will retract the ram's down stroke; an emergency hand button located on the upper right side of the press will freeze the press operation; the extent of the ram's stroke and pressure can be preset by mechanical, adjustable collars providing not only an efficient but complete operational control for maximum safety. These many features provide the second benefit which creates a production job that does not demand skilled labor.

Carbon is used as a core because it gives off carbon monoxide at a temperature of 1200° F which removes all oxygen from the inside shell of the casting, a condition which must exist before casting can take place.

Hydraulic press forming of these cores represents a savings in time, in money, and gives greater flexibility to this process.



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can provide the basic structural strength to withstand the tremendous stresses, strains, and loads of a modern "bay-spanning" bridge!

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can do the job where the prerequisite quality in an abrasive calls for steel's hardness, toughness, and strength.

"TRU-STEEL" Is TRUE STEEL

The original high carbon, fully heat-treated steel shot of tool steel quality. TRU-STEEL is solid, hard, and tough — TRUE STEEL in Chemistry, Characteristics and Performance.

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Write for full information on TRU-STEEL and what it can do for YOU in YOUR cleaning operation!

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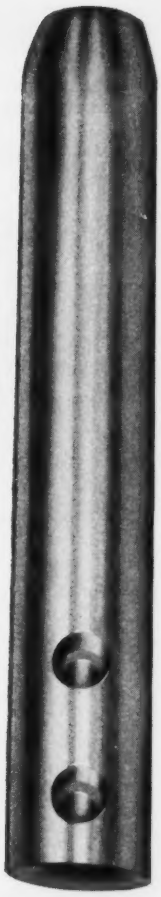
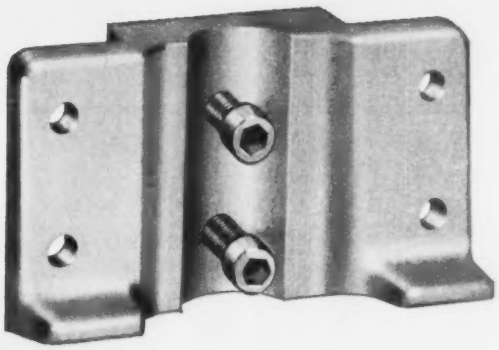


ADAMS 1" ROUND PIN

Side Mounting—Reversible
Countersunk Both Sides
Hardened—Ground
Hard Chrome Plated



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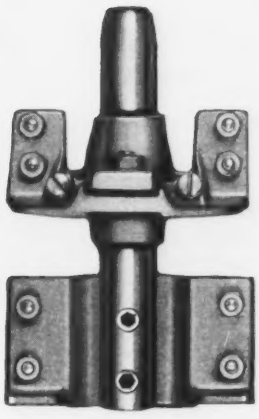
For Side Mounted Reversible Pins
Pins Mounted with Allen
Hollow Head Set Screws

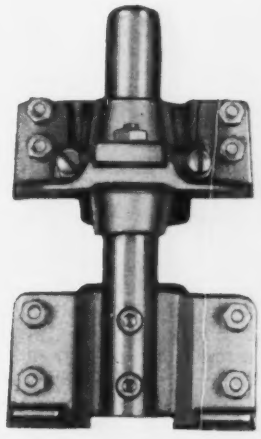
ADAMS MATCH PLATE EAR

Extra Long for
1" diameter Pins
(Side Mounted)



ADAMS 1" ROUND PIN AND EAR
(For Cherry Flasks)

Side Mounting Permits Use of
Extra Long Match Plate Ear As-
suring Expert Deep Pattern Draw



ADAMS 1" ROUND PIN AND EAR

(For Aluminum Flasks)
Side Mounting Assures Rigidity
of Pin. Adds Extra Life Because
of Simple Reversible Feature

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"With the present emphasis on quantity production and the backing away from little orders for development work, we might be missing a big opportunity"

Anti-Casting Fad Phobia

WHEN I was a young cub designer in one of the inventions departments of the National Cash Register Co., Dayton, Ohio, my Dad warned me against the danger of becoming infatuated with each new device I had met for the first time. Like a son, I tried to assure him that in this respect I had everything under control, but Pop cited instances where I obviously had pried my designs apart to squeeze in some recent infatuation—a toggle, a dash pot, a solenoid, a mutilated gear movement or a sheet metal substitute for a casting.

He told me that by just glancing at some new design there at the plant he could usually identify the designer by the characteristic trail he left of his peculiar and pet mechanical infatuations. Pop stressed the point that the old law of economics simply would not tolerate such self-pampering for long.

Many years ago I became all het up about the hydraulic properties of rubber, and as a result I developed a rubber-faced punch for sheet metal forming dies. Later still, going steady with my crush, I tinkered with rubber diaphragm indicating instruments (seismographs and such), which led to diaphragm molding work. Still in that rut, I now am using a rubber bulb for tensile testing sand. So Pop was right—we sure can go hog wild on a personal basis if we don't watch out.

All of which brings me to evidences of this very same human streak in the shops I visit on my many trips. Not long ago I was invited to speak before the engineering supervisors of a well known manufactruing concern and to take a trip through their plant afterwards.

During this trip I half jokingly said to my host, "If you folks should run into the need for some tricky, intricate little casting in which love of the art, a modicum of skill, infinite patience and pride of craftmanship seem to be called for, I'll sic the entire organization of the Lee Hobby Foundry onto the project." "That we will do, Doc," said my host," that we will do," as he veered to the right and led me into the engineering stock room where they kept their raw materials, supplies and a pitiful little quantity of castings (not too hot, either).

Going through the shop, I had seen that band sawing out of plates, doweled and bolted structures, hoggings out of big bars, forgings and the like were very much the fad—and sadly so in many instances, to my foundry-jaudiced eye. I just itched to sit beside the tables of the designers I saw and get in some licks before it was too late for some well chosen and highly rewarding castings.

I've gone through plants where they've plumb run amuck with structural steel shapes and gone clear around Robin Hood's barn with rivets and welding—unbelievable extremes in the light of the savings and advantages castings could have provided.

Foundrymen should advise designers

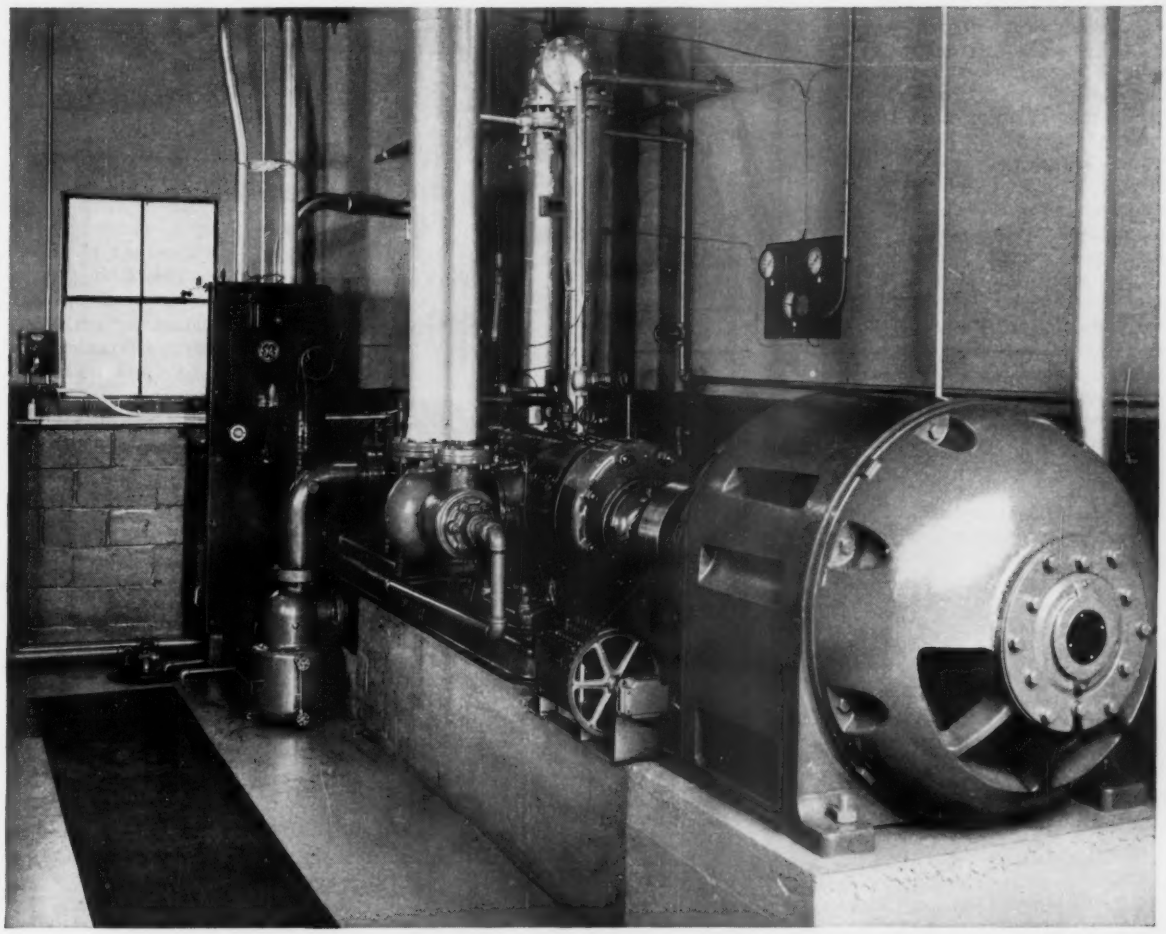
In other plants I saw products which evidently were designed from catalogs and built of purchased units, one thing tacked on to another in awkward and expensive assemblies where a few well chosen and designed castings would have saved them no end of time and money and would have given their customers much more for their money. These folks, through force of habit or because of fear, evidently thought themselves allergic to castings.

I think we have a point here in recognizing the natural tendency to have crushes and personal biases, to follow fads and to get into ruts as instinctive human traits that need to be dealt with in the promotion of our cast metal product services. Of course a merchandising foundry that sells castings over the counter, so to speak, to purchasing agents with patterns and requests for competitive bids wouldn't be interested in these fad phenomena.

But it seems to me that up-and-coming foundrymen who practically weep in their beards over the lost souls who in ignorance are wasting their substance by attempting to use casting substitutes ought to gird up their loins and go to battle.

When production prints are issued, it's almost too late to evangelize those suffering from the no-casting phobia. As a former sales promotion manager, I feel that it would be well worth our while to recognize the strategic importance of the preproduction print issuance period in any manufacturing program.

Then, too, in spite of the reputation designers frequently have among foundrymen of being bullheaded when



Fuller Rotary Two-Stage Compressor, C135-135H. Capacity 680 c.f.m., 100-lb. pressure, 690 r.p.m., 150 hp. motor.

16,000 HOURS OF OPERATION WITH NO MAINTENANCE

Empire Steel Castings, Inc., Reading, Pennsylvania, installed a C-135-135H Fuller Rotary Two-stage Compressor in April 1953. After 32 months—approximately 16,000 hours of operation—the compressor received a routine inspection, when a new set of blades was installed in the higher-pressure cylinder.

The Empire engineers report no down-time since replacement, although they've added 4,000 operating hours. Prior to switching to Fuller, their former experience with compressors was a different story—as many as several overhaulings in one year. With Fuller equipment furnishing a constant high capacity air supply, production costs have been greatly reduced.

Here's how Empire uses compressed air:

- In the molding department, supplying all air for pneumatic rammers, all squeeze and jolt machines, automatic set-out and lifting apparatus of mold conveyors, automatic shake-out machines, mold cleaning and spraying equipment.
- In the core department, for ramming equipment, spraying and torch drying equipment, core oven operation as well as core blowing equipment.
- In the cleaning department, pneumatic chipping hammers and grinders, blacksmith requirements, sand-blasting, pressure testing and miscellaneous tools.
- In the heat-treating department, heat treating furnace operation and cooling equipment.

To get all the facts and engineering data, write today for Bulletin C-5A.

C-298
3662

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it comes to the use and design of castings, I know, as one who still has calluses along the belt line from having leaned over drafting boards for years, that given on a proper basis, casting suggestions are welcome. These suggestions are particularly helpful if they come at the right time, not after the design has been crystallized, when they would cause all sorts of complications.

This being the case, it looks as though we ought to get acquainted with the engineering personnel in our communities. We certainly don't need to feel underhanded about such an effort, being able to do as much for them as they can do for us, and perhaps more. Making the rounds, we should be able to get wind of what's up or coming in the way of new development programs and projects. And certainly nothing can prevent us from getting better acquainted with the lines of products their firms manufacture.

If, then, we are in a position to provide experimental and engineering casting service for the formative stages of engineering programs, it seems to me we wouldn't have to be supersalesmen to get in on the ground floor and grow up with these projects to the point of tooling. This looks like a long way around, but other businesses do it—most of them have to.

It might well be that with all the present emphasis on foundry mechanization, quantity production and the backing away from little piddling orders of loose pattern jobs for engineering and development work, we might be cutting off our noses to spite our faces. I believe that such work can and will pay off if kept under control and under the name of business development, in the same category as advertising.

I may be way out on a limb, but I'll be doggoned if I can see how castings are going to get the competitive break they deserve if we don't get a crack at product designs before the production prints are issued. I for one am going over to see those folks I was telling you about, those with the piddling little pile of castings in stock. I feel quite sure that the Lee Hobby Foundry could do them a darned good turn and vice-versa.

"Th' core's 18 feet wide and this door's—Oh, No!"

California Plant Holds Series of Pattern-Casting Seminars

Late last year, a series of pattern and casting seminars was conducted at U. S. Electrical Motors Inc., Los Angeles, to acquaint area personnel who contact pattern shops and foundries with the technical aspects of patterns and castings. Speaker at the meetings was W. G. Stenberg, supervisor of the metals department at U. S. Electrical Motors.

About 75 persons attended each of three sessions which lasted for over three hours. Over 30 different types of patterns were exhibited and each one, from the most simple to the most difficult, was discussed individually. The importance of the drawing board was emphasized along the lines of sufficient draft, proper radii, elimination of cores, loose pieces, etc. Various common foundry problems also were discussed.

Equipment Company Moves

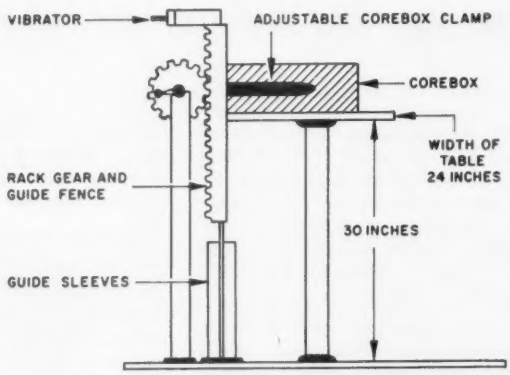
Risney Foundry Equipment Co. now is located at P. O. Box 36, Hales Corners, Wis. The Milwaukee telephone number is Garden 5-5311.

HOW TO DO IT

Difficult To Remove Manually Core Drawing Machine Lifts Cores

HAND DRAWING of intricate cores sometimes is extremely difficult. Furthermore, the difficulty often causes a bottleneck in the coreroom of foundries using core blowing machines. A simple core drawing machine has eliminated the difficulty in the author's foundry.

The device, which achieves a positive, accurate draw by mechanical means, is shown here. It consists of two clamping arms which grasp each side of the corebox. The arms are attached to the legs of a movable guide fence to which a rack gear also is attached at the back. A hand-turned pinion engaged with the rack raises and lowers the clamps. An air vibrator vibrates the assembly during drawing of the core. The entire device is constructed of components welded together. The device can be power-operated by substituting a pneumatic piston beneath the guide fence in place of the rack and pinion.



Do you have any tricks of the trade tucked away with your foundry experience. Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

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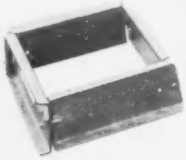
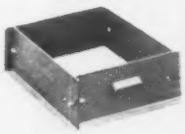
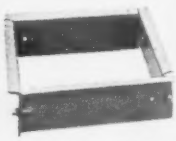


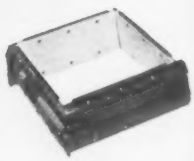
Type I
3/16" Steel
"Eliminate Shifts"



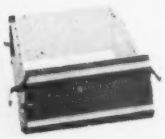
Type II
¼" Steel
"Reduce Crushes"



Type III
¼" Steel
"Fewer Run-outs"



Type IV
10 Gauge Steel
¼" Transite
"Less Maintenance"



Type V
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⅛" Transite
"Lower Costs"

- The only jacket which is adjustable to fit different size molds—just drill more holes for more sizes.
- The jacket is self-aligning with controlled flexibility.
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- Metal catching lugs have been eliminated so the jacket operates longer. Maintenance is easy as this is the only flexible jacket whose sides will lie flat.

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Company _____
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Circle 669 on Inquiry Card—Page 51

Obituary

Charles A. Gutenkunst Jr., 57, president, Milwaukee Malleable & Gray Iron Works, Milwaukee, died Feb. 16. He became associated with the company, founded by his father and uncle, following graduation from University of Wisconsin. After their

CHARLES A. GUTENKUNST JR.

deaths, Mr. Gutenkunst became president, and his brother secretary-treasurer. Long active in the Malleable Founders' Society, he was its president from 1942 to 1944 and in 1953 received its Charles H. McCrea award for outstanding service to the industry.

Duncan Forbes, 60, chairman of the board and former president, Gunite Foundries Corp., Rockford, Ill., died Feb. 15. His great grandfather was a pioneer in production of malleable iron. After graduation from Yale University, Duncan Forbes spent some time in the laboratory of the late Prof. Enrique Touceda studying the metallurgy of malleable iron. In 1921 he joined the family firm, Rockford Malleable Iron Works, and in 1928 Gunite Foundries was organized. Mr. Forbes was a former president and director of American Foundrymen's Society and a director of Malleable Iron Research Institute, forerunner of the present Malleable Founders' Society.

Martin L. Ritter, manager of sales, Farrell-Cheek Steel Co., Sandusky, O., died Feb. 8. He was associated with the company for over 40 years in a sales capacity.

Edward J. Kauffman, 76, until his retirement two years ago, president, Kauffman Mfg. & Supply Co., Hagerstown, Md., died recently. Early associations included the Frick Co., Waynesboro, Pa., and Moore Engineering Co., Hagerstown. He started his own foundry in 1938.

Joseph F. Joy, 73, founder of Joy Mfg. Co., Pittsburgh, died Feb. 19 in Ft. Pierce, Fla. In recent years he was a consultant engineer with offices in Pittsburgh and Franklin, Pa., as well as consultant for the Joy Mfg. Co.

H. O. Lown, 76, owner, San Angelo Foundry & Machine Co., San Angelo, Tex., died Feb. 4. A native of Sweden, he operated various machine shops in this country until 1926 when he started the San Angelo foundry.

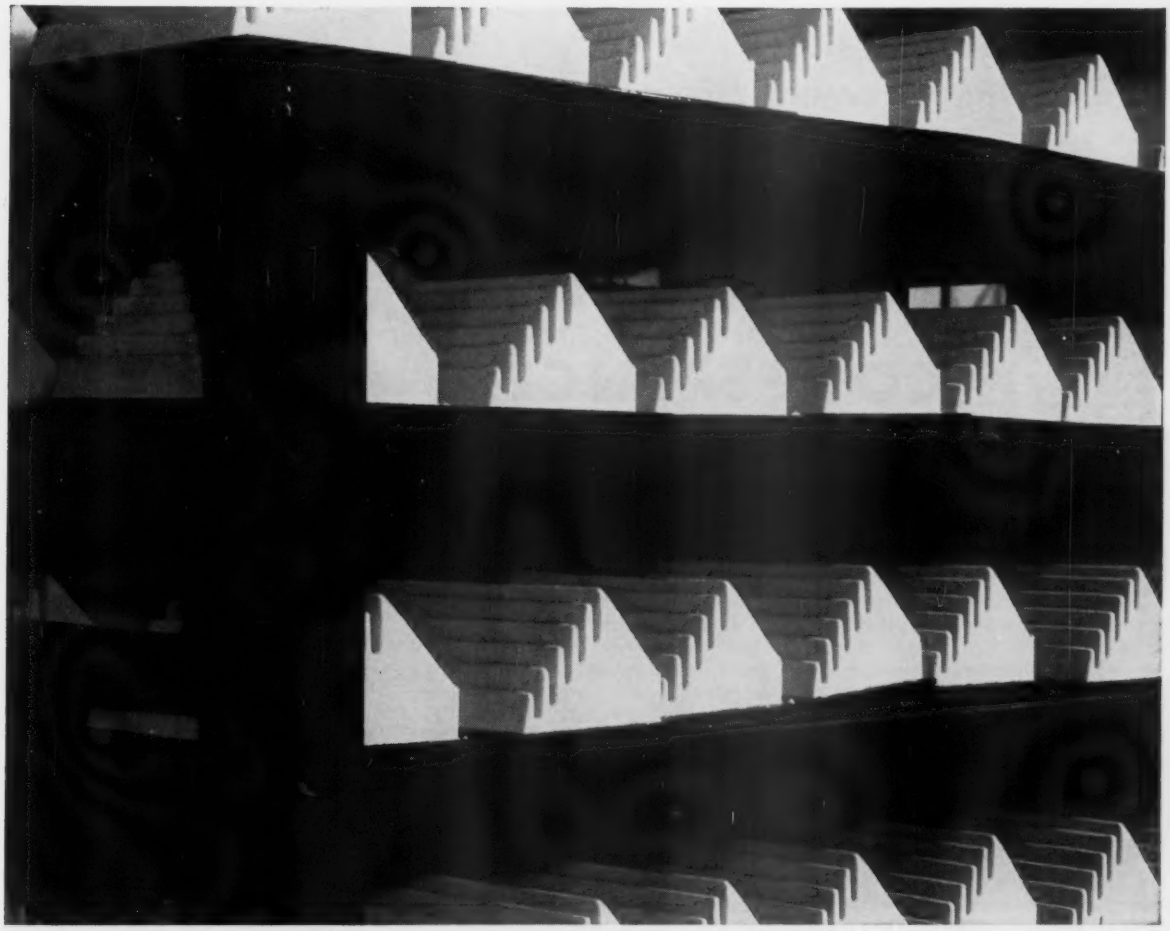
Clifford D. Kennard, 70, veteran University of Kentucky patternmaker and foundry technician, died Feb. 11, in Lexington, Ky.

John R. Linck, 60, assistant superintendent, Artra Aluminum Foundry & Mfg. Co., St. Charles, Mo., died recently.

Boniface A. Miller, 55, vice president-general manager, Crown Non-Ferrous Foundry Inc., Chester, Pa., died Feb. 17. A graduate of Loyola

BONIFACE A. MILLER

University, Baltimore, he did graduate work at University of Maryland. Prior to joining Crown foundry in 1954, Mr. Miller spent 20 years with Baldwin-Lima-Hamilton Corp., Philadelphia, where he became superintendent of manufacturing and foundry products. A former chairman of the Philadelphia Chapter of the AFS, for more than 10 years he had been active in committee work of the AFS Brass and Bronze Division.



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Circle 670 on Inquiry Card—Page 51

Quality Improvement Discussed at

SOUTHEASTERN FOUNDRY CONFERENCE

By ROBERT H. HERRMANN
Associate Editor

Frank W. Shipley, left, national AFS president, presents John Drenning, chairman, Birmingham District Chapter, AFS, with a statue in recognition of 25th Southeastern Foundry Conference

Harry W. Dietert, national AFS vice president, is shown as he addressed the luncheon meeting

BIRMINGHAM District, Tennessee, and University of Alabama Student Chapters of the American Foundrymen's Society co-operated in sponsoring the 25th annual Southeastern Regional Foundry Conference. Held Feb. 21-22 at the Dinkler-Tutwiler Hotel, Birmingham, the meeting drew an attendance of 503. A wide variety of subjects was covered in ten technical sessions.

Some Sand, Some Metal, Some Manmade Defects—Clyde A. Sanders, American Colloid Co., Chicago. Casting precision, tolerance and finish are overplayed. Buyers are expecting greater degrees of precision than are practical in production. Foundrymen should not look for a new process to eliminate troubles that can be avoided by good practice using time-tried foundry methods.

Effort should be directed to producing and using better quality green sand patterns. Castings can be no closer to the desired size than the pattern permits. Good molding practice will produce molds closer to pattern size. Molds should have more uniform density throughout, on vertical as well as horizontal surfaces. Good molding and flask equipment will reduce shifts and wobbly draws. Proper pouring and gating methods will eliminate metal impurities from castings.

Cost Control Methods in the Foundry—J. A. Westover, Westover Corp., Milwaukee. Control procedures are one of management's best tools for improving production and lowering cost. Control is defined as a means to predetermine, secure and maintain adherence to management's established objectives, plans, policies, programs and standards.

Procedures of control were outlined for the accounting and maintenance departments, systems work engineers and for supervisors of productive labor in the various foundry departments.

A film, portraying techniques of five coremakers making identical cores, was shown to illustrate the importance of determining and using proper work methods.

Epoxy Resins in Pattern Applications—T. O. Mahaffey, Kish Resin Inc., Lansing, Mich. Polyester, phenolic and epoxy resins generally are used or making plastic patterns, coreboxes and drier patterns. Polyester costs 50-80 cents a pound, shrinks 0.010-0.012 in./in. in ¼-in. sections, has 10,000 psi compression and 5000 psi tensile strength.

Phenolic costs 50-70 cents a pound, shrinks 0.0004-0.0006 in./in. in ¼-in. sections, has 4000-7000 psi compression and 800-1500 psi tensile strength. Epoxy costs about $1.50 a pound, shrinks 0.0001-0.0004 in./in. in ¼-in. sections, has 20,000 psi compression and 10,000-15,000 tensile strength.

Because of its strength, epoxy is favored for foundry applications. It may be cast to shape, and, when used in that manner, usually contains a filler of aluminum powder, Al_2O_3, Fe_2O_3 or clay, depending upon characteristics required. Epoxies also are used in laminations with glass cloth.

Gating and Risering—Harry Kessler, Sorbo Mat Process Engineers, St. Louis. Shrinkage differs in various strength irons. It is less in low-strength and nodular irons. Also, low-strength iron takes longer to solidify. A factor based on liquid shrinkage and fluidity of different strength irons was developed for computing riser weight. The diameter of a riser should be 1½ times maximum section size of the casting; its height should be twice its diameter. The neck area should be the value of half the riser diameter in square inches when riser diameter is 4 in. or less and equal to the riser diameter in square inches when riser diameter is over 4 in.

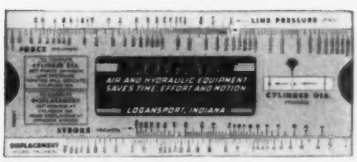
Side risers attached so that they heat up sand around the neck are recommended. Heating the sand has the same effect as enlarging the neck.

Air Pollution Control Equipment for Cupolas—R. C. Ortgies, American Air Filter Co., Louisville, Ky. Today's methods of cupola charging coupled with the quality of available scrap and the economic need for foundrymen to produce high ton-

Illustrated—Logansquare Cylinder.

Look to Logan

the ultimate in air cylinder design



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nages of low cost iron have increased the problem of air pollution. Tests showing cupola emission at various melting rates point up the problem. A 96-in. cupola discharged 117 lb of contaminants per hour to the atmosphere when operating at half capacity. The melting rate was 13.2 tons per hour with a blast volume of 8000 cfm. At three-quarters capacity, or 19 tons per hour and at 10,350 cfm blast volume, total effluent was 275 lb—two and one-quarter times that at half capacity. At full melting rate of 23 tons an hour, using air at 41,350 cfm, discharge to the atmosphere increased to 318 lb or two and three-quarter times the amount at half melting rate.

Solids discharged from cupolas are classified as cinders, dust and metallic fumes and smoke. Different types of collection equipment are designed to collect some or all of the contaminants. The equipment was described with advantages and disadvantages of each cited.

Carbon Dioxide Cores in Production—Frank Scaggs, Oklahoma Steel Castings Co., Tulsa, Okla. Transition in the speaker's foundry from green sand and dry sand cores to sodium-silicate-bonded cores was described. Reasons for changing were to reduce handling, breakage, labor, and equipment costs. Several difficulties were encountered but gradually were eliminated. The sand mixture most generally used is 200 lb AFS 55 silica sand, 100 lb AFS 100 silica sand, 15 lb collapsible sodium silicate, 2 lb cereal and 2 lb iron oxide.

About 60 per cent of core production is with sodium-silicate-bonded sand. Although use of this type core is not more economical than use of conventional cores, the highest level of efficiency obtainable with the process has not been reached.

Highlights of Modern Brass and Bronze Foundry Practice—Harry M. St. John, consultant. Three major points were discussed: Should new methods such as shell molding or the CO_2 process be adopted? How far to go in mechanization. How to improve present foundry practice.

No new method indicates that green sand molding will become obsolete in the near future. The situation in the coreroom, however, is different. Dielectric drying is showing advantages but soon foundrymen may be making cores with binders that require little or no baking. Such cores may be solid or hollow.

Foundry mechanization depends mostly on labor cost. A foundry can afford to invest $15,000 to $20,000 for every man it saves.

On improving practices, Mr. St. John highlighted the points he has been presenting in a series of articles now appearing in FOUNDRY.

Operating a Basic, Water-Cooled Cupola—A. P. Alexander, International Harvester Co., Memphis, Tenn. After deciding to make nodular iron castings, the speaker's foundry concluded that it could not produce such iron economically from an acid cupola and at the same time make good quality gray iron. Now, with about two year's basic cupola experience in pouring nodular and gray iron castings from the same base metal, the conclusion is reached that the operation is successful. Both irons meet or exceed specifications.

The change to basic operation was made on production cupolas during regular casting schedules.

Control of Quality for Copper-Base Alloy Castings—F. L. Riddell, H. Kramer Co., Chicago. Although casting quality is the highest in history, customers are demanding even higher standards from foundrymen. To meet those demands requires closer control over raw materials and foundry methods. Major items on which quality control can pay off are: Casting design; raw materials—metal, mold material, fuel and other supplies; foundry practice—melting, pouring, gating and risering; equipment and the human element.

Good practices were outlined for each of these fields.

Which Core Process?—Warner B. Bishop, Archer-Daniels-Midland Co., Cleveland. Today, four major core-making processes are in use. They produce the conventional oil or resin-bonded, baked core; the resin-bonded shell core, the gas setting core and the air setting core. Foundrymen face the problem of when to use which process and where.

Since a core's only purpose is to produce a dimensionally accurate cavity in a casting, the best core is the cheapest one that does the job efficiently. To aid foundrymen in making a decision, Mr. Bishop listed advantages and disadvantages of each type of core.

Specific requirements will indicate which process is most advantageous. Generally, the conventional process may be best on long runs where economy is the major consideration. On long runs where tolerance and finish are paramount, shell cores have advantages. For large core work where skilled labor can be saved, air-setting cores offer economies. The gas setting process is valuable for short-run medium work.

Brief talks were made at the luncheon meeting by Frank W. Shipley, national AFS president, and William W. Maloney, AFS general manager. Harry W. Dietert, AFS vice president, spoke on the theme that the individual person is the most important man in today's society. Foundry management must recognize that fact and devote more effort to personnel relations. At the banquet, Harry A. Stuhldreher, U. S. Steel Corp., Pittsburgh, spoke on "Everybody's Business."—*The End*

Officers and directors of Birmingham District Chapter attending the conference are shown above; those from the Tennessee Chapter are shown below

ANNOUNCEMENT

to all foundrymen

Sand-coating resins are now available for use in all standard, foundry mullers. This means that all foundries can use the Acme PlastiSand Process in its entirety.

Acme Resin Corporation chemists and engineers are the developers of resin-coated sand for cores and shell molding. Economy, safety and superior molds are the achievements of these coated sands. Washed and dried silica sands have been used with hot mulling. New developments have now made it possible to use the majority of unwashed bank sands, with cold process mulling, in almost any available equipment.

Now, even greater economies can be effected in every foundry by mixing PlastiSand in its own plant.

Resin formulation and the coating process covered by Patents 2,706,163 and 2,706,188

NEW!

This folder gives full information about the PlastiSand Process. Cold, warm and hot processes are outlined and the coating procedures explained. It may be obtained by writing to the Acme Resin Corporation at the address shown below.

Among the advantages of PlastiSand are:

ECONOMY . . . Foundries using the PlastiSand Process report superior molds with as little as one-half the resin content formerly necessary with dry resin.

SHORTER DWELL, FASTER CURE . . . Less time on the pattern and a faster baking cycle mean more production, add to the economy of using the PlastiSand Process.

NON-SEGREGATING . . . Each grain of sand is completely and uniformly coated with liquid phenolic resin in the PlastiSand Process—segregation cannot occur.

SUPERIOR TENSILE STRENGTH . . . PlastiSand molds have much greater cold strength, a factor gaining importance as new stack pouring techniques are developed.

DUST FREE . . . Because liquid-resin is used there is no dust. An invaluable safety and health factor. The absence of dust means healthier working conditions, no irritating dust fumes, no danger of dust explosive.

GREATER PRODUCT UNIFORMITY . . . Because it is non-segregating, resin-coated sand prepared by the PlastiSand Process yields almost identical molds, batch after batch.

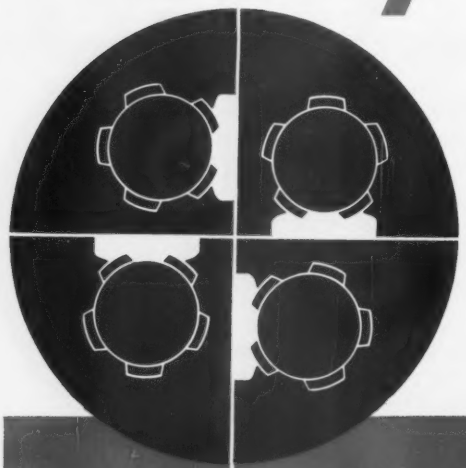
ACME RESIN CORPORATION

1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

(A Suburb of Chicago)

Circle 672 on Inquiry Card—Page 51

...any way



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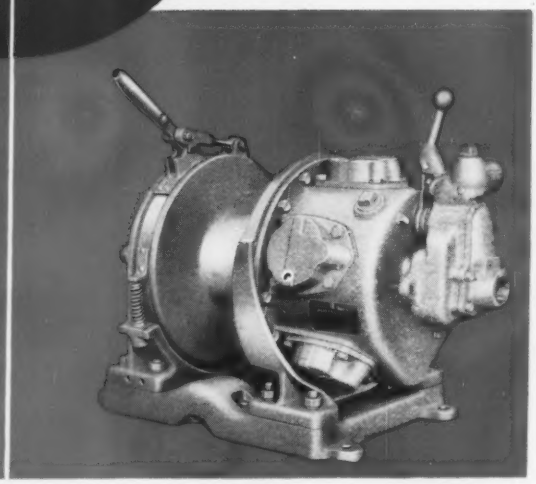
this is your BEST BUY in



"UTILITY" AIR HOISTS

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Mounts in any position your job requires. Easily dolly-mounted for portability. This complete line of winch-type Ingersoll-Rand Single Drum "Utility" Air Hoists meets every hauling and hoisting need for loads from 750 to 4000 lbs. Backed by dependable Ingersoll-Rand engineering for long, trouble-free service and high efficiency.

For applications requiring small or heavy-duty overhead hoists, check the Ingersoll-Rand hoist line for capacities up to 24,000 lbs.

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8-534

1957 Material Handling Show Scheduled for Philadelphia

More than 200 companies will display and demonstrate material handling equipment at the 1957 National Material Handling Exposition. The show will be held Apr. 29 through May 3 at Convention Hall, Philadelphia. The last exposition was held in Chicago two years ago.

A Material Handling Conference is being held concurrently with the exposition to permit visitors to supplement their inspection of machinery with discussions of case histories of material handling installations. A few of the scores of types of machines to be demonstrated indicate the diversity of modern material handling equipment. Fork lift trucks, conveyors, hoists, monorails, tractors, trailers, elevators, stackers, power shovels, and other equipment will be demonstrated under simulated factory conditions.

Advance registration cards may be obtained from Clapp & Poliak Inc., 341 Madison Ave., New York 17.

Two-Day Conference To Discuss High-Temperature Materials

Materials attractive for use at 1500°F in aircraft, missiles, and nuclear reactors will be under discussion at a two-day conference to be held Apr. 16-17 in the Hotel Carter, Cleveland, under sponsorship of the Cleveland Section of the American Institute of Mining, Metallurgical, and Petroleum Engineers.

Papers will cover the present status of development, basis of strength, problems, and shortcomings

and future of each class of materials. Effects of vacuum melting and testing environment on high-temperature properties will be discussed. The program has been arranged with the co-operation of the institute's High-Temperature Materials Committee.

Book Analyzes Open-Hearth Speed and Fuel Efficiency

A New Look at the Nature of the Open-Hearth Process by B. M. Larsen, research supervisor, United States Steel Corp., Monroeville, Pa., has been published as a book by the National Open Hearth Steel Committee, American Institute of Mining, Metallurgical and Petroleum Engineers.

Mr. Larsen has endeavored to give a unified analysis of the open-hearth process in relation to factors that control speed and fuel efficiency. Rate of heat flow in the bath, rate of carbon oxidation and net heat requirement from fuel in relation to the amount of "air oxidation" from preheated or leakage air are treated quantitatively.

The analysis indicates that fuel consumption might be reduced to about 2 million Btu per ton with a charge-to-tap time of about five hours per heat if maximum advantage can be taken of the maintenance of an actively boiling bath with a supply of preheated air in suficient excess above the needs of fuel combustion. This supply requires a tight system with maximum regenerative efficiency.

Copies are available through the office of AIME, 20 West 39th St., New York 18, N. Y. Price is $3.00 to nonmembers, $2.00 to members.

Holds New England Conference

The 11th annual New England Regional Conference of the American Institute of Mining, Metallurgical and Petroleum Engineers will be held May 17 and 18, 1957, at Hotel Statler, Boston. The subject of the program will be "Melting and Solidification."

A session on metals science on May 17 will include talks on "Gases in Metals" by Clyde M. Adams Jr., Massachusetts Institute of Technology, and "Principles of Solidification and Application to Grain Refinement of Cast Metals" by J. Walker, General Electric Co. Talks on Saturday will include a discussion of continuous casting. Chairman of the conference is Walter A. Backofen, assistant professor of metallurgy, MIT.

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SEALS OUT
sand and dirt
for
longer life
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Exclusive new front-end design assures more efficiency, less wear and longer life. Sand, dirt, or abrasive material cannot enter the bore of the guide or the barrel to cause friction and wear. Compact, lighter-weight design improves handling. Balanced blows make the tool float over the work faster and easier. Write for form 5216 describing both bench and floor units or ask for a demonstration in your plant.

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8-504

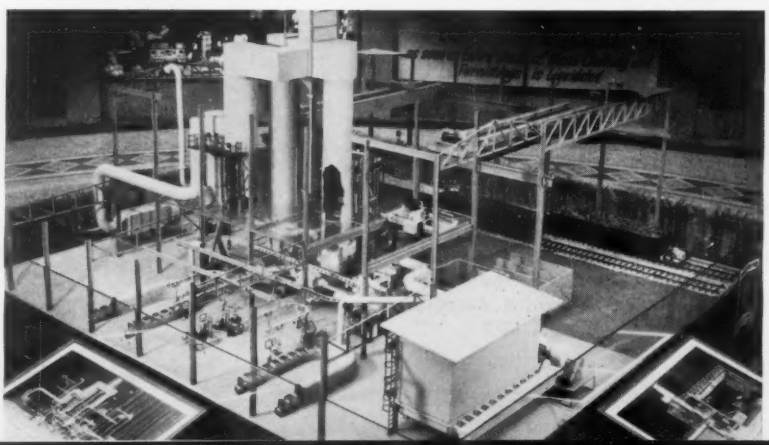
News Views

MATERIAL HANDLERS MEET: Officers of the Material Handling Institute Inc. for 1957 met in Cleveland recently to select the MHI committee chairmen for the year. From left to right are Eugene Caldwell, Hyster Co., second vice president of MHI; R. L. Fairbank, Towmotor Corp., MHI first vice president; L. West Shea, managing director of MHI; and George G. Raymond Jr., Raymond Corp., MHI president

MARKS ANNIVERSARIES: Celebrating his company's 80th year in business and the 50th year of its plant location in Elmira, N. Y., Charles F. Kennedy, president, Kennedy Valve Mfg. Co., right, presented this special, chrome-plated, Safetop Kennedy hydrant to Elmira's mayor, Edward A. Mooers. The hydrant is located on East Water St., directly in front of the Kennedy Co. plant site

DELIVERS TESTIMONY: Representative Wright Patman (D., Tex.) congratulates Robert T. Sheen, 1956 president of Instrument Society of America, for testimony he delivered before the Patman subcommittee on the Joint Economic Report. Mr. Sheen urged establishment of engineering extension services in land grant colleges and development at the National Bureau of Standards of a center for control information

SHOW FOUNDRY MODEL: This $36,000 model of a foundry was sent to Cleveland during Engineers' Week, Feb. 16-23, by Whiting Corp., Harvey, Ill. An authentic working scale model of a complete automotive foundry, the exhibit was displayed in the rotunda of the Old Arcade in Cleveland, where it appeared chiefly through efforts of Michael A. Fanelli, vice president of Hoist Equipment Co.



LITHIUM METAL

by the GRAM or **TON**

Nearly a decade of experience producing Lithium Metal commercially is at the beck and call of the non-ferrous foundryman. Lithium is decidedly no stranger to this important, fast-growing industry. A unique element serving many unique purposes, Lithium's affinity for oxygen has for years been utilized to reduce porosity in copper and copper alloy castings. The result is a dense, oxygen-free electrical conductivity casting. Of yet further benefit is the amount of Lithium used as compared with the amount of end-product made. In the degasification, deoxidation and desulfurization of metals, for example, as little as 0.005% or 2¼ grams of Metallic Lithium make a sounder, more uniform non-ferrous casting. Cost, then, can also be a relatively insignificant factor. Put Lithium to work for *you*. Our banks of electrolytic cells can supply experimental grams or commercial tons of this admirably versatile metal. Write for details of actual foundry tests.

... trends ahead in industrial applications for lithium

LITHIUM CORPORATION OF AMERICA, INC.
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PROCESSORS OF LITHIUM METAL • METAL DISPERSIONS
METAL DERIVATIVES: Amide • Hydride
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INGOT MOLDS

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You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

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Cost of Using Independent Truckers Can Be Reduced

Methods Are Suggested For Better Utilization

By Robert Dyment

MANY foundries use private freight carriers for shipping and receiving of goods and supplies, and freight rates are becoming increasingly higher. There is no reason to believe that rates will not continue to climb, thereby increasing the problem.

One approach to this problem is for foundries to streamline their shipping and receiving departments to help motor carriers operate more efficiently.

The Genesee Region Truck Owner's Federation, Rochester, N. Y., an association of intercity common motor carriers, has come up with some recommendations designed to ease the lot of the carrier and to simplify shipping and receiving operations. Such co-operation can help to reduce trucking costs and also shave overhead dollars. Foundries will find these recommendations helpful in cutting costs and streamlining their freight, receiving and shipping departments.

Co-operation with their freight carriers may enable foundries to reduce their trucking costs

Preparation of Shipment—1. Package properly for easy handling. 2. Mark properly for easy distribution. 3. Type the bill of lading in advance. 4. Call the carrier so that he can plan his pickups.

Selection of a Carrier—1. Know your carrier and his key personnel. 2. Select only recognized carriers. 3. Select the carrier with the most direct service. 4. Select the carrier with the lowest through rate commensurate with good service. 5. Keep to a minimum the number of trucks in your receiving and shipping rooms.

Shipping—1. Have sufficient help available. 2. Avoid congestion on your shipping platform. 3. Have proper handling facilities. 4. Make sure that you're open during the hours the carrier works.

Claim Filing—1. Prepare documents properly. 2. Know the statute of

WHEELABRATOR® STEEL SHOT

cuts abrasive costs for

ALL TYPES

of foundries

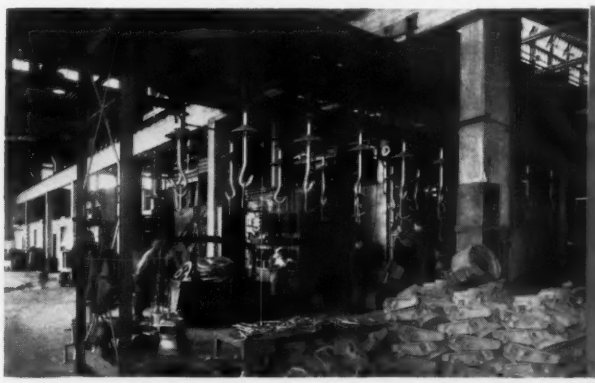
STEEL JOBBING FOUNDRY

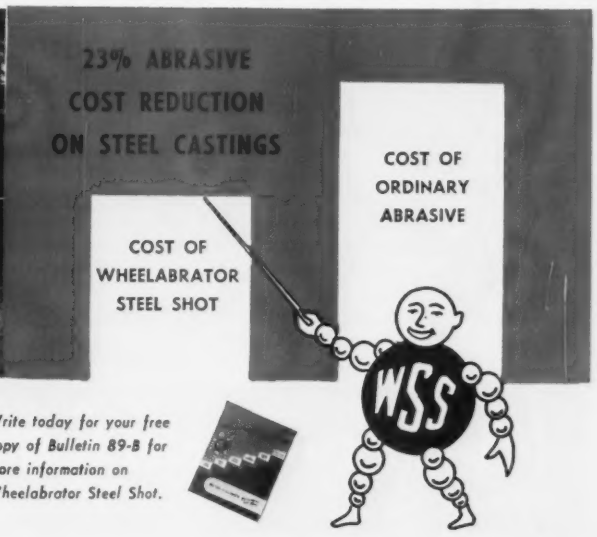
saves $8,000 a year

Tests made in a 3-wheel Wheelabrator Monorail Cabinet at Crucible Steel Castings Co. showed these results: In 322 hours, the 3 wheels consumed more than 19,000 lbs. of the ordinary abrasive that had been used. Abrasive cost averaged $1.578 per wheel hour for each wheel. In 202 hours, the machine used approximately 6,800 lbs. of Wheelabrator Steel Shot. Average abrasive cost was $1.215 per hour for each wheel. The Milwaukee steel foundry operates 10 wheels a total of 100 hours each day, so daily abrasive savings add up to $36.30, or about $8,000 a year.

Similar tests by other foundries have shown similar results — some making even more than the 23% savings registered by Crucible Steel Castings Co. Wheelabrator Steel Shot has brought abrasive savings and reduction in parts wear and maintenance expense to all types of foundries — steel, gray iron, malleable, large, small, jobbing, production, etc. Why don't you save with this versatile abrasive, too?

The findings reported above resulted from tests conducted in the Wheelabrator Monorail Cabinet shown below.





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505 South Byrkit Street, Mishawaka, Indiana

Write today for your free copy of Bulletin 89-B for more information on Wheelabrator Steel Shot.

limitations. 3. Keep all packing available for inspectors.

Tracing—1. Make sure the carrier you are tracing is the one handling the shipment. 2. Have name of shipper, origin, destination and date of pickup available when tracing. 3. Make sure you have the original bill of lading on hand. 4. Do not make unnecessary demands on time of tracing. 5. Give the carrier a reasonable time to transport the merchandise.

Routing—1. Be sure to route by a carrier you know services the origin. 2. If you route the best way or the cheapest way, make sure your supplier notifies you how and when he shipped.

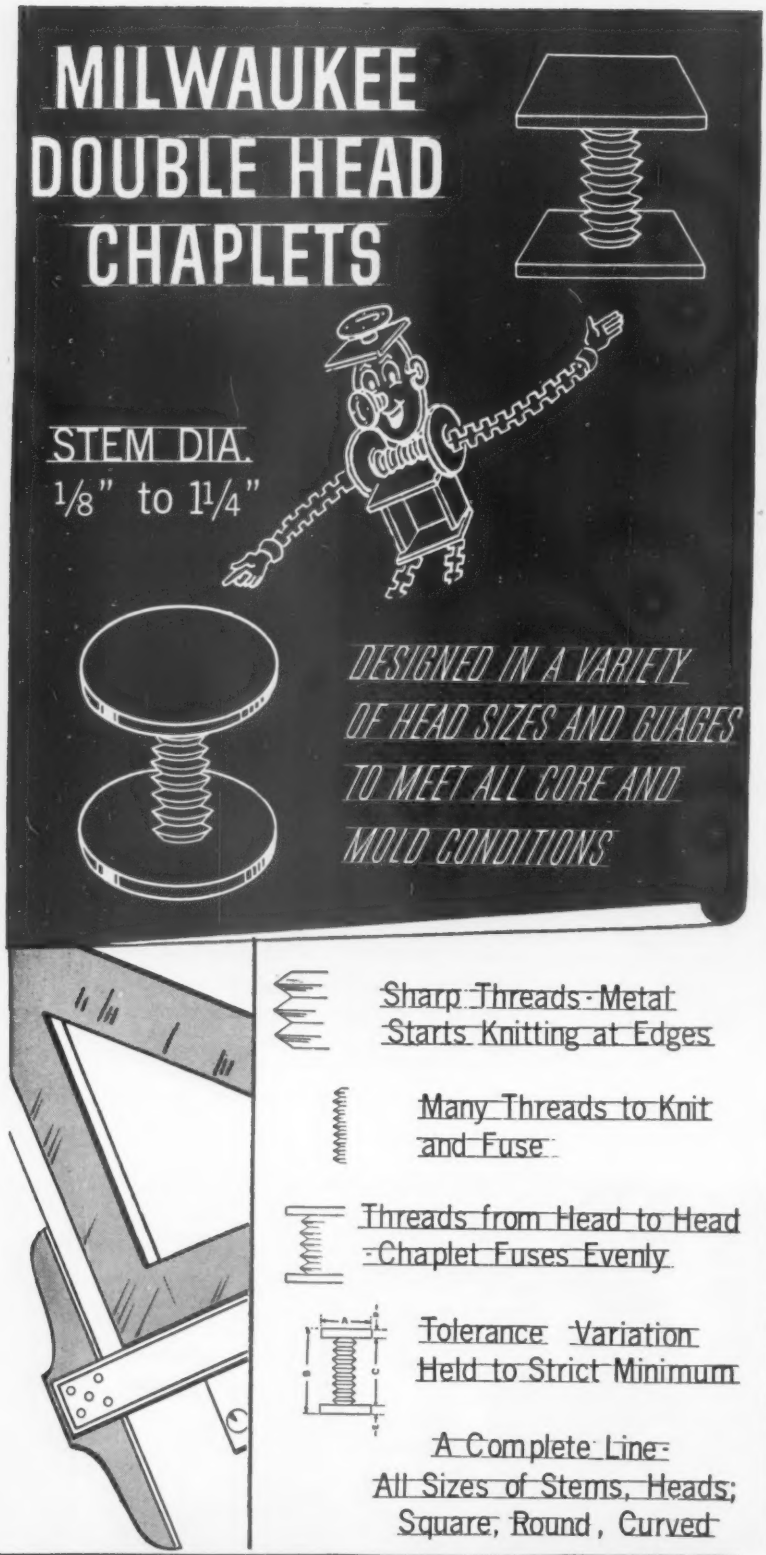
Receiving and Inspecting—1. Instruct receiving personnel to check condition of the outside container before signing for a shipment. 2. If the outside container shows indications of inward damage, inspect it at once. 3. If outside damage is obvious or possible loss is suspected, check contents and make a notation on the freight bill. 4. Don't ask the carrier for ambiguous notations on your freight bill. 5. Don't refuse a shipment until you are sure you cannot use it. It is very costly for the carrier and customer to handle refused shipments.

Payment of Freight Bill—1. Try to arrange credit rating with your carriers. Much time is wasted in cash payment. 2. If you pay for your shipments by cash, you might open a checking account for that purpose so that larger amounts can be paid at the time of delivery. 3. Pay your charge freight bills within the prescribed seven-day ICC limitations. This promptness saves the carrier the additional cost of a follow-up. 4. Don't arbitrarily make changes in amounts on the freight bill before remitting without contacting the carrier.

Take an Active Part in Rate Cases—Accomplish this objective through your local transportation organizations, chamber of commerce and others.

Avoid Congestion at Your Place of Business—1. Congestion often is caused by attempts to favor too many carriers, each one not having a large enough stake in your business to give the personal service you deserve. 2. Try to utilize carriers that offer the largest coverage with the best service.

Special Services—Don't ask your carrier for special services which increase costs. The freight rate you are charged covers a free pickup by one man, transportation over the road and a free delivery by one man. Additional handling or special services are chargeable beyond this rate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DOUBLE HEAD
CHAPLETS
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1/8" to 1 1/4"
DESIGNED IN A VARIETY OF HEAD SIZES AND GUAGES TO MEET ALL CORE AND MOLD CONDITIONS
Sharp Threads-Metal Starts Knitting at Edges
Many Threads to Knit and Fuse
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Tolerance Variation Held to Strict Minimum
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All Sizes of Stems, Heads; Square, Round, Curved
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to the shipper or receiver.

A couple of other good ideas are to encourage your purchasing agent and others to see transportation representatives and to encourage your shipping and receiving clerks to study transportation subjects in local colleges.

Rensselaer Polytechnic Plans Technical Writers' Institute

Fifth annual Technical Writers' Institute will be held at Rensselaer Polytechnic Institute, June 10-14. The institute is designed for those who supervise technical writing in business, industry, and the professions. The over-all workshop includes sessions on manuals and instruction books, reports, technical promotion, training programs, industrial films, and graphic and illustrative aids. A special group of lecturers, in addition to the Rensselaer staff, will demonstrate outstanding accomplishments in technical writing.

Inquiries may be addressed to Jay R. Gould, director, Technical Writers' Institute, Rensselaer Polytechnic Institute, Troy, N. Y.

Vacuum Metallurgy Lectures

New York University College of Engineering plans a program of 25 lectures on vacuum metallurgy June 10-14. Specialists will discuss vacuum pumping systems, thermodynamics, specific processes, designs and operation of arc and induction melting systems, and applications of vacuum processed materials.

The course is open to persons with a general engineering background including some metallurgy. Inquiries should be addressed to Dr. R. F. Bunshah, associate engineering scientist, New York University College of Engineering, University Hgts. 53, N. Y.

Eaton Holds Sales Clinic

The annual sales clinic of Eaton Chemical & Dyestuff Co., Detroit, was held Feb. 11-16 at the Whittier Hotel, Detroit. It was attended by company officials and 16 salesmen from the United States and Canada. On Feb. 16, the 44 members of the 1838 Club, which consists of employees with five years or more of service with the company, held their annual dinner at the Prince Edward Hotel, Windsor. The name of the club derives from the company's having been founded in 1838, by the late Theodore H. Eaton.

You need Pangborn DUST Control in your plant!

Processing operations in a plant often release dust that settles on floors, walls and equipment. This dust hampers the efficiency of men and machines and makes plant housekeeping a continuing, costly burden.

Pangborn Dust Control stops that. Pangborn Collectors trap dust at the source, clean so thoroughly that in the winter many firms cut heating costs by recirculating the already-heated, cleaned air.

In addition, Pangborn gives you the bonus benefits of longer machinery life, more efficient employees, better employee and community relations and extra profits from any salvage value. Complete line of collectors for all jobs.

Discover how *you* can profit from Pangborn Dust Control—write for Bulletin 922. PANGBORN CORP., 1400 Pangborn Boulevard, Hagerstown, Maryland.

Pangborn CONTROLS DUST

Circle 679 on Inquiry Card—Page 51

long on looks...

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The finest malleable shot and grit on the market

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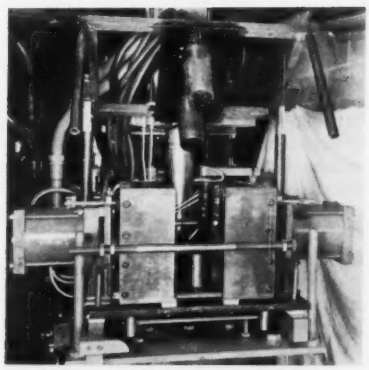
FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 212



SHELL BLOWING MACHINE

Automatic shell blowing machine, Model H1-1622, produces shell cores or shell molds automatically. Cores or shells are made within 30 seconds. Flexibility is such that hollow cores, solid cores, contoured shell cores or liner cores be made. Shell cores up to 15 x 20 x 30 in. in height or shell molds up to 16 x 22 x 15 in. draw can be made. Special features include vertical or horizontal parting fixtures (shown here). These fixtures are used for handling four-part draw coreboxes up to 15 x 20 x 30 in. in height. Heated mandrels are used to produce the hollow cores. Made by **C & S Products Co.**, 18656 Fitzpatrick Ave., Detroit 28, Mich.

For More Details Circle No. 401—Page 212

WET WATER SYSTEM

Wet water system features an active, completely soluble and highly concentrated multiphase wetting compound that is scientifically formulated to reduce the interfacial tension of ordinary water and increase the wettability of all types of dust and powdery materials. The compound is furnished as a solidified cartridge for use in the Aquadyne Hydroblender where it dissolves in the proper proportion to the water passing through a venturi nozzle, giving a solution of about 30 dynes surface tension. Sand conditioning, separating and blending, core mixing, shakeout, patching and cupola relining are areas in the foundry where the system has application. Made by **Aquadyne Corp.**, 89 Terminal Ave., Clark, N. J.

For More Details Circle No. 402—Page 212

ENGINE DRIVEN WELDER

Engine-driven welder with battery start and direct coupling between engine and generator is available in 300 and 400-amp models. Built for heavy-duty service, the unit has no projecting generator or controls that can be damaged in on-the-job operation. Both models have a duty-cycle of 60 per cent, rated temperature rise of 50°C, open-circuit voltage of 80 and operate at a maximum 2150 rpm. The 300-amp unit has a welding range of 50 to 375 amp and electrode capacity of 3/32 to 5/16 in. The 400-amp unit has an operating range of 80 to 500 amp and electrode capacity of 1/8 to 3/8 in. Made by **Welding Dept., General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 403—Page 212

Becomes Regular Feature of

FOUNDRY

Since last September, the Penton Publishing Co. has been conducting a research study on the service a tabloid-type publication might provide the foundry and allied industries. Three issues were published on an every-other-month basis, and the various ramifications of the project were studied carefully. This research indicates that the industry can be served more effectively by publishing the latest information on machines and materials in FOUNDRY. Therefore, starting with this issue, Foundry Equipment and Supplies Digest will appear as a feature of FOUNDRY.

CORE BINDER

Core binder called Dexocor is a white, water-soluble powder consisting of about 94 per cent corn sugar, a small amount of anticaking agent and the remainder ammonium sulfate which functions as a catalyst to transform the dextrose into resin-like substances during baking. Advantages claimed for the binder are

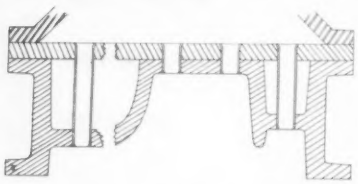
that it is dry, easy to handle, reduces baking time, imparts high moisture resistance, has high hot strength, easy shakeout, simplifies muller cleaning and boosts green strength. Exhaustive tests indicate the binder contains properties that comprise desirable requirements for optimum all-around performance while contributing to rapid strength development under heat, low gas evolution and excellent collapsibility. Made by **Corn Products Sales Co.**, 17 Battery Pl., New York 4, N. Y.

For More Details Circle No. 404—Page 212

SAND ARRESTER TUBES

Nylon sand arrester tubes for use in coreboxes are available in any length with 1/16-in. wall and outside diameters of 3/8, 1/2, 5/8, 3/4, 7/8 and 1 in. Toughness and wear resistance of nylon make it an excellent material for protection against abrasion. Tube tips are choked to

hold back sand stems. Tips may be reformed with torch or soldering copper if shaping to box contour removes choke. Tubes can be inserted and removed without harm to tube or hole. Head of tube is flared



to fit into chamfer made in top of corebox or blowplate with an ordinary countersink. Tubes will not stretch or shrink and are not harmed by solvent or corebox washing solution. Made by **Martin Engineering Co.**, Neponset, Ill.

For More Details Circle No. 405—Page 212

MOISTURE CONTROLLER

End-point automatic moisture controller measures the temperature and moisture of sand in the mill and shuts off water flow when temper is reached. Advantages claimed for the controller are: Fast action keeps ahead of any mill; does not require a constant batch size; variable dial settings for any number of different sands and moisture ranges; few moving parts reduce maintenance costs, and correctly tempered sand molds uniformly, improves production, finish and quality. Made by **Harry W. Dietert Co.**, 9330 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 406—Page 212

CORE BARROWS

Redesigned core barrow incorporates tubeless tires to provide better service in areas where scrap metal, nails or other foreign material damages tires. Coil springs, plus the pneumatic running gear, assure safety to sand cores during transportation. Built-in balance puts the load on the wheels rather than on the handles of the unit. Handles are "hand high" requiring no lifting of the load. Made by **Chicago Mfg. & Distributing Co.**, 1928 West 46th St., Chicago 9, Ill.

For More Details Circle No. 407—Page 212

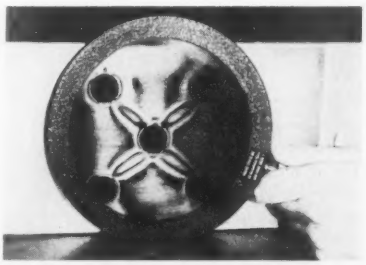
CO_2 BINDERS

Three grades of Adcosil CO_2 core binders are available and supplied with a color indicator which turns the core purple. This color remains in the core until it is properly cured, at which time the core returns to its normal sand color. This system can serve as a guide in rigging vents and designing cores for efficient flow of CO_2. The binders are labeled F for ferrous metals, NF for nonferrous metals and SC for super collapsibility. Made by **Archer-Daniels-Midland Co.**, 2191 West 110th St., Cleveland 2, O.

For More Details Circle No. 408—Page 212

STRESS ANALYSIS

PhotoStress is a stress analysis technique in which a transparent plastic is bonded to the actual part and strains are determined under actual test conditions. It can be used on full size structures or components made of metal, concrete, wood, glass,



plastic, rubber, stone or other materials regardless of size or shape. It is both quantitative and qualitative and can be used both statically and dynamically in determining the strength of structures in service. It combines both optical and electronic methods of instantly locating and evaluating accurately the regions of maximum strain. It can be used at temperatures ranging from minus-67 to 284°F. Distributed by **Tatnall Measuring Systems Co., a subsidiary of Budd Co.**, 2450 Hunting Park Ave., Philadelphia 32, Pa.

For More Details Circle No. 409—Page 212

PORTABLE PYROMETER

Portable pyrometer for nonferrous foundries is designed for accurate temperature measurements under severe operating conditions. The pyrometer includes a shock-resisting instrument movement mounted in a substantial cast aluminum alloy case and an enclosed, protected thermocouple in an extension lance with adjustable angle head. The thermocouple is suited to temperature measurements of not over 2300°F. The protected thermocouple is mounted in the tip of the lance and takes temperature readings below the surface of molten metal with a true reading unaffected by dross or surface conditions. Made by **Illinois Testing Laboratories Inc.**, 420 North LaSalle St., Chicago 10, Ill.

For More Details Circle No. 410—Page 212

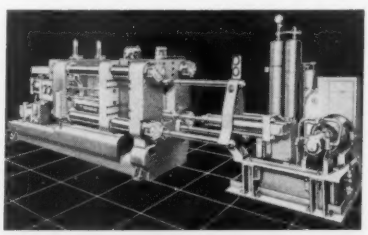
STEEL BATTERY TRAYS

All-steel battery trays for electric-powered hand trucks comform to dimensions and practices recently adopted by the Industrial Truck Association. Trays are classified according to ITA hand truck battery groups one through nine, ranging in widths from 6⅝ to 18¼ in. and are available for 12, 18 and 24-v hand truck batteries. Trays are available for 64 models of the company's motive power batteries. Trays are of welded steel. Two four-fingered grip and cable openings at the top of both sides of the trays allow ample space for safe and convenient raising of the cover. Covers may be hinged at front or back of the tray. They are held closed by a spring steel clip, and the covers open flush with the vertical plane of the back of the box. Made by **Exide Industrial Division, Electric Storage Battery Co.**, Philadelphia, Pa.

For More Details Circle No. 411—Page 212

DIE CASTING MACHINES

High-pressure, cold chamber die casting machines are available in 200, 400, 600 and 800-ton capacities. Clamp link-wedge locking mechanism, plus heavy platens and tie rods, locks and preloads dies to rated tonnage.



Heavy central screw adjustment is motorized and has pushbutton operation for quick die setup and tonnage control. Refined injection end has made possible production of difficult castings with a minimum of 'cut and try" on gates, vents and overflow. Pressures and press cycle controls are designed for recording so repeat setups can be made. All pos-

sible safety features are included. Made by **Hydraulic Press Mfg. Co., Division of Koehring Co.,** Mt. Gilead, O.

For More Details Circle No. 412—Page 212

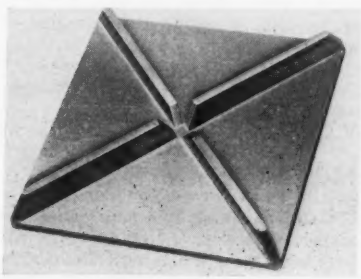
TRUCK BATTERIES

Battery for electric industrial trucks is available in 40, 60 and 120-amp-hr positive plate capacities. The active battery material is regenerative oxide, which adds to plate life. Plate packs are wrapped in perforated plastic envelopes. Separators are microporous rubber, and retainers are highly porous spun glass 0.50 in. thick. Element protectors and jars are hard rubber. Made by **Gould-National Batteries Inc.,** Stone and Calhoun Sts., Trenton 7, N. J.

For More Details Circle No. 413—Page 212

CORE PLATES

Lightweight aluminum core plates are said to facilitate core handling, often cutting two-man operations to one man. Ribbed design permits heat circulation below the core plate to



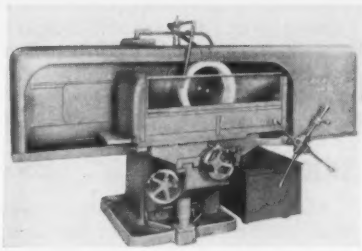
speed conduction, reduce baking cycle time and increase production. Sturdy construction reduces maintenance and repair problems. Plates are supplied in a wide range of standard sizes or are built to customer specifications. Made by **Jo-El Co.,** 6188 Pearl Rd., Cleveland 30, O.

For More Details Circle No. 414—Page 212

FLOOR TREATMENT

Floor preparation, called Sure-Etch, reportedly etches and cleans floors in a single application to prevent paint peeling from cement or concrete. Material is brushed over the area to be painted and a bubbling process opens the floor pores. After rinsing and drying, the floor is ready for painting. Sure-Etch is recommended for floors where acids, alkalis, oils, grease or other stubborn floor conditions prevail. One gallon will cover about 200-250 sq ft. Made by **Colonial Refining & Chemical Co., Western Division,** 555 Industrial Blvd., Kansas City 15, Kans.

For More Details Circle No. 415—Page 212



FACE GRINDER

Face grinder with 18 in. cup-shaped grinding wheel mounted perpendicular to the table incorporates a motorized spindle, eliminates pulleys and belts and furnishes a simple, powerful drive. It is equipped with a 15-hp, 900-rpm, heavy-duty motor. When used for grinding castings, it eliminates all milling or planing and requires minimum stock to be left on for finishing. The grinder can be used for any flat, square surface grinding job. Made by **Abrasive Machine Tool Co.,** East Providence, R. I.

For More Details Circle No. 416—Page 212

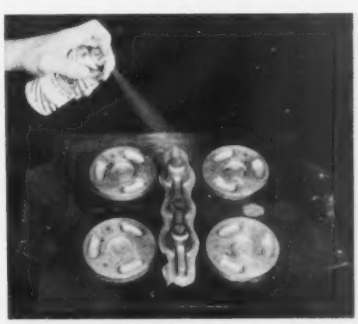
LENS CLEANING STATION

Dispenser simplifies cleaning lenses of protective eyewear. The dispenser is wall mounted and contains an 8-oz bottle of antifogging lens-cleaning fluid as well as single optical tissues dispensed from two positions and a receptacle for used tissues. Lens cleaner for refills is available in pints and gallons. Optical tissues, 5 x 9 in., 240 tissues per box, are available by the carton. Made by **United States Safety Service Co.,** 1215 McGee St., Kansas City, Mo.

For More Details Circle No. 417—Page 212

LIQUID PARTING

Liquid parting for foundry use is available in 12-oz self-spraying aerosol containers for use on small and medium-size jobs where connecting of an air hose, gun and other accessories would be too costly. A light, even coating sprayed over the surface of matchplates or patterns reportedly will last and serve as a parting agent for 20 to 60 molds. Manufacturer

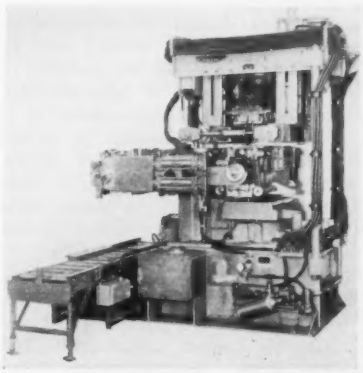


reports that in addition to the simplicity, convenience and effectiveness of the container it requires no fuss, leaves no waste, needs no stirring and no set-up work. Spray is actuated by pressing a button. Made by **Frederic B. Stevens Inc.,** 1800 Eighteenth St., Detroit 16, Mich.

For More Details Circle No. 418—Page 212

COREBLOWER

Two-station core production unit incorporates two corebox carrier cradles and corebox rollover devices working between a coreblowing and a coredrawing station. Sequence is interlocked by automatic controls for operation on preset time cycles. Machine will handle jobs requiring side draw-back of loose pieces, vertically split, horizontally split or dump coreboxes. Corebox platens, drier clamps, horizontal clamps and a powered core rollout conveyor can be provided. A single or double shuttle blow head or



a single stationary blow head is available. One operator is required and production is rated at 240 to 300 boxes per hour. Made by **Osborn Mfg. Co.,** 5401 Hamilton Ave., Cleveland, O.

For More Details Circle No. 419—Page 212

PLASTIC GOGGLES

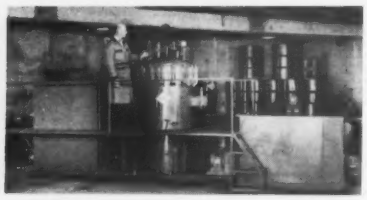
Flexible plastic goggles are molded from soft vinyl material, are contoured to fit snugly and can be worn over most personal glasses. Wide window lenses are curved to allow full vision. Small perforations, angled away from the eyes, provide ventilation. Two lens styles, clear or green plastic, are available. Made by **Chicago Eye Shield Co.,** 2300 Warren Blvd., Chicago 21, Ill.

For More Details Circle No. 420—Page 212

IMPREGNATION UNITS

Batch type impregnation units for use with plastic or metal oxide sealing materials are designed for impregnation of all kinds of pressure castings. Designated model P-100

series, the equipment consists of a 300-gal sealant supply tank, a 200-gal sealing tank and a 450-gal rim-spray rinsing tank. Unit includes vacuum pump, heating elements, motor-driven agitator and controls. Floor space required is about 66 x



200 in. Standard model is equipped with gas heating elements but electric or steam heating designs are available. Made by **Prenco Products Inc.**, 507 East 10 Mile Rd., Hazel Park, Mich.

For More Details Circle No. 421—Page 212

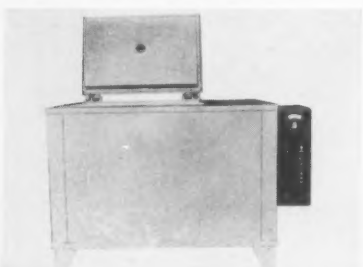
THERMOSETTING PLASTIC

Certified Metaplastic is a thermosetting epoxy resin plastic used for repairing dents, holes, breaks or scratches in metal. It adheres tenaciously to iron, steel, aluminum, wood, glass and most plastics, according to the manufacturer. A unit consists of an equal volume of resin and hardener, both in paste form. It is unaffected by acids, alkalis, solvents, greases, oils, heat or cold. Cured, finished surfaces may be sanded, bored, turned or otherwise treated as though part of the metal. Made by **United Laboratories Inc.**, 16801 Euclid Ave., Cleveland 12, 0.

For More Details Circle No. 422—Page 212

TOP-LOADING OVEN

Electrically heated or gas-fired ovens permit loading and unloading down from the top, either manually or by overhead hoist. Work space dimensions are 24 in. front to



rear x 30 in. from top to bottom x 36 in. wide. Over-all dimensions are 38 x 44 x 67 in. Ovens are built to individual size requirements. Top opening door may be counterbalanced or not. Either horizontal or vertical recirculating air flow patterns can be provided. Insulation is varied to suit the maximum temperature specified. Made by **Grieve-Hendry Co.**, 1401 West Carroll Ave., Chicago 7, Ill.

For More Details Circle No. 423—Page 212

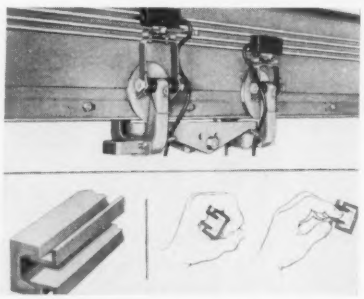
SILICON

Several new grades of silicon metal with reduced iron content are available to expand the company's line in a range from 0.50 per cent maximum iron content up to 1.25 per cent iron. Grades now offered are a maximum 0.50 per cent, maximum 0.75 per cent, maximum 1.00 per cent, a maximum 1.25 per cent, a low-calcium grade and low-aluminum grade. Made by **Electro Metallurgical Co., Division of Union Carbide & Carbon Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 424—Page 212

SAFE ELECTRIFICATION

Polyvinyl chloride extrusion covering on standard bus bar electrification prevents accidental contact with live bus wires. Manufacturer claims



it is impossible for an adult's finger to enter the shield. Labeled Kant-Shock, the shielded electrification is mounted in stamped bracket assemblies for live power feed throughout the system at a maximum rating of 600 v, 100 amps. It can be applied in the field where headroom permits. Made by **American MonoRail Co.**, 13107 Athens Ave., Cleveland, O.

For More Details Circle No. 425—Page 212

ZIRCON MOLD COATING

High-refractory zircon coating for cores and molds has a melting point above 3750°F and may be applied by brushing, dipping, spraying or swabbing. Material is light gray-white in color and is shipped in dry powder form ready for use with the addition of water. Coating is silica-free, nontoxic, stays in suspension and does not ferment, draw moisture or tear drop. Coatings should be oven or torch dried to expel water. Made by **S. Obermayer Co.**, 2563 West 18th St., Chicago 8, Ill.

For More Details Circle No. 426—Page 212

Literature for Foundrymen

PATTERN PAINT

Folder provides general information on an aluminum pattern paint for making wood patterns impervious to moisture and most solvents, an aluminum plastic for filling nicks, cracks and chips in metal or wood patterns, and a clear corebox paint that is resistant to abrasion and waterproof.—**M. A. Bell Co.**, 217 Lombard St., St. Louis, Mo.

For More Details Circle No. 427—Page 212

CORE OILS AND BINDERS

Information folder emphasizes advantages to be obtained through use of Hy-Ten core oils, binders and release agents made to fit the needs of gray iron, steel and nonferrous foundries.—**E. F. Houghton & Co.**, 303 West Lehigh Ave., Philadelphia 33, Pa.

For More Details Circle No. 428—Page 212

ABRASIVE BELT UNIT

Bulletin 104 presents several applications for company's 6-72 abrasive belt unit that can be used for almost every type of belt grinding and polishing within the capacity of its 2½-in. belt and 2-hp motor.—**Grinding & Polishing Machinery Corp.**, 2530 Winthrop Ave., Indianapolis 5, Ind.

For More Details Circle No. 429—Page 212

FOUNDRY EQUIPMENT

Catalog F-7 illustrates and describes company's equipment for foundry use including shakeouts, sand screens, lump crushers, sand conditioners, feeders and conveyors. —**Simplicity Engineering Co.**, Durand, Mich.

For More Details Circle No. 430—Page 212

ROTARY DRIERS

Bulletin RDB-101 gives design, construction and other details of two dual-flow rotary driers for drying granular materials with no loss of fines. Models can evaporate 200 and 400 lb of water per hour.—**Carpco Mfg. Inc.**, Jacksonville 6, Fla.

For More Details Circle No. 431—Page 212

DUST COLLECTORS

General data, operating features, construction details and specifications for cloth filter and cyclone separator dust collectors are provided in catalog 39.—**Torit Mfg. Co.**, 287 Walnut St., St. Paul 2, Minn.

For More Details Circle No. 432—Page 212

GAS APPLICATIONS

Information letter No. 80 outlines the applications of gas in iron foundries and presents a diagram indicat-

USE THIS CARD FOR ADDITIONAL DETAILS ON EQUIPMENT, SUPPLIES, AND LITERATURE DESCRIBED IN THIS SECTION

FOUNDRY
APRIL 1957

401	421	441	461	481	501
402	422	442	462	482	502
403	423	443	463	483	503
404	424	444	464	484	504
405	425	445	465	485	505
406	426	446	466	486	506
407	427	447	467	487	507
408	428	448	468	488	508
409	429	449	469	489	509
410	430	450	470	490	510
411	431	451	471	491	511
412	432	452	472	492	512
413	433	453	473	493	513
414	434	454	474	494	514
415	435	455	475	495	515
416	436	456	476	496	516
417	437	457	477	497	517
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ing where these applications are found.—**American Gas Association, Industrial and Commercial Gas Section,** 420 Lexington Ave., New York, N. Y.

For More Details Circle No. 433—Page 212

AIRLESS BLAST CLEANING

"Soil Pipe Cleaning News" deals with automation in cleaning rooms of soil pipe foundries. Case histories are given showing how soil pipe and fittings are cleaned automatically in both standard and specially-designed airless abrasive blast cleaning machines. — **Wheelabrator Corp.,** 102 South Byrkit St., Mishawaka, Ind.

For More Details Circle No. 434—Page 212

LADLE HEATING BURNER

Information sheet illustrates and provides general information on a self-contained ladle heating burner that can be installed in existing equipment with no appreciable change in facilities or production methods.—**Thermal Research & Engineering Corp.,** Conshohocken, Pa.

For More Details Circle No. 435—Page 212

CONVEYOR BELTING

General information, installation suggestions, technical data and recommendation charts for standard and special stitched canvas conveyor and elevator belting are included in catalog.—**C. R. Daniels Inc.,** Belting Division, Daniels, Md.

For More Details Circle No. 436—Page 212

OPTICAL PYROMETER

Leaflet TO_1 illustrates and describes a partial radiation optical pyrometer of the disappearing filament type for measuring temperatures from 1300 to 6300°F. The pyrometer is of German design.—**Epic Inc.,** 154 Nassau St., New York 38, N. Y.

For More Details Circle No. 437—Page 212

PORTABLE POWER TOOLS

Catalog of industrial portable power tools includes general information, comparative specifications and application data on belt and disc sanders, bench and portable grinders and grinding wheels, cut-off wheels for metal and masonry, saws and hack saws for metalworking applications.—**Skil Corp.,** 5033 Elston Ave., Chicago 30, Ill.

For More Details Circle No. 438—Page 212

LUBRICATION EQUIPMENT

Automatic bearing lubricators and industrial hand and air-powered lubrication, including high-pressure lubrication supply pumps, are illustrated and described in catalog 403.—**Gray Co.,** 1039 Sibley Rd., N.E., Minneapolis 13, Minn.

For More Details Circle No. 439—Page 212

ELECTRIC FURNACES

High-temperature electric furnaces for research, quality control and small-scale production, feature flexibility of control and instrumentation to meet any requirement, from simple manual operation to complex anticipatory systems using feed-back principles. Six models are available with firing chamber sizes from 7 x 7 x 9 in. up to 36 x 36 x 40 in. Heating elements are silicon carbide, providing an operating range up to 2800°F. Power rating is 220 v ac, single phase on small models; 440 v ac, three phase also can be supplied. Made by **Harrop Electric Furnace Division, Harrop Ceramic Service Co.,** 3470 East Fifth Ave., Columbus 19, O.

For More Details Circle No. 440—Page 212

CONTACT WHEEL

Rubber contact wheel for use on backstand grinding and polishing operations is said to increase abrasive belt life as much as 40 per cent.

Featuring a slashed serration, the "X" wheel is formed from an abrasive-resistant neoprene. Flange construction eliminates possibility of misseating as it is an integral part of the hub and is attached permanently to the hub. Wheel is 14 in. in diam with 1, 2, 3 and 4-in. face widths and in several durometers. Manufacturer reports that 20, 35, 55 and 80 durometers are suitable for most applications. Made by **Chicago Rubber Co.,** 651 Market St., Waukegan, Ill.

For More Details Circle No. 441—Page 212

POWER SWEEPER

Industrial power sweeper is powered by a 15-hp air-cooled engine and features a multiple disc reversing clutch, three-speed transmission and drive-axle-mounted differential, and a heavy chain drive to make up the power train. Dust system incorporates a high-volume fan which deposits all dust into a heavy-duty bag that can be cleaned without removal from the machine. Fingertip switches on the steering column actuate the hydraulic dump on the hopper and the 7-in. lift of sweeping chamber enabling the machine to

sweep bulky debris. Tests indicate the sweeper can sweep 126,000 sq ft per hour when sweeping at 6 mph. It is equipped to sweep at 10 mph. Made by **Wilshire Power Sweeper Co.,** Dundee Ave., Elgin, Ill.

For More Details Circle No. 442—Page 212

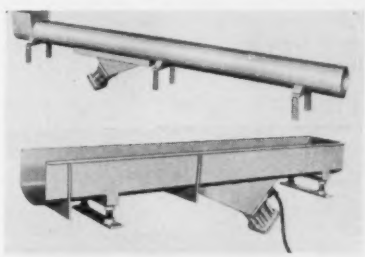
METAL INSPECTION

Material for aqueous phase magnetic particle inspection of metal to detect flaws reportedly replaces kerosene, prevents rusting, is nonflammable, odorless and self cleaning. The material, Immunol 438, is mixed one part to 17 parts water. This mixture suspends uniformly either fluorescent or nonfluorescent paste. Made by **Harry Miller Corp.,** 4th and Bristol Sts., Philadelphia 40, Pa.

For More Details Circle No. 443—Page 212

VIBRATING FEEDER

Vibrating feeder for handling bulk material like sand, gravel and small parts uses a vibrating force generated by a pneumatic drive mechanism. Drive mechanism has one moving part with no cams, bearings, belts or gears. Enclosed construction is designed to seal out dirt and keep



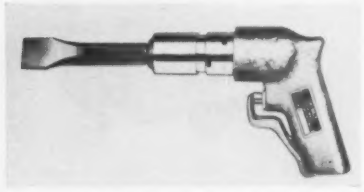
the drive free from destructive foreign matter. Rates of feed reportedly are easily changed and adjusted. Frequency of vibration is selected by varying the operating air pressure over a range of 30 to 90 psi, providing control of the feed rates. Feeders are supplied in pan, trough or tubular construction with a selection

of lengths and rates of feed. Made by **Cleveland Vibrator Co.**, 2728 Clinton Ave., Cleveland 13, O.

For More Details Circle No. 444—Page 212

AIR HAMMER

Model SP1200 air hammer weighs 50 oz, measures 6 in. long and consumes 6.5 cfm of air at 1500 psi. Operated with one hand, a metering



trigger lets the operator control the hammer's power anywhere from 0 to 9000 blows per minute. It attains full speed and power of operation on less than 7 cfm. According to the manufacturer, the rapid stroke makes it an excellent unit for cutting metal with a cold chisel, cleaning castings, scaling and cleaning welded joints or grooving steel or cast iron. Made by **Superior Pneumatic & Mfg. Inc.**, 4758 Warner Rd., Cleveland 25, O.

For More Details Circle No. 445—Page 212

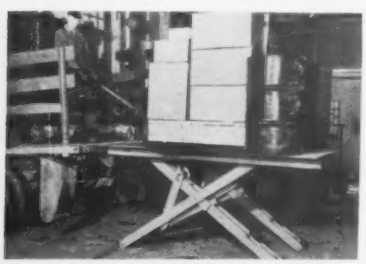
BLACK LIGHT

Compact, Twin-lite black light with utility handle contains two 4-watt black light lamps which activate fluorescent materials in the 3600 angstrom range. Operating on 60 cycle, 110 v ac, lamp life is rated at 2500 hr. Lamp is said to be useful for industrial inspection, analysis and identification purposes. Made by **Norco Mfg. Co.**, 392 Bleecker St., New York 14, N. Y.

For More Details Circle No. 446—Page 212

LIFT PLATFORM

Semiportable industrial lift platform requires no installation and supports 5000 lb of load at 2500 lb

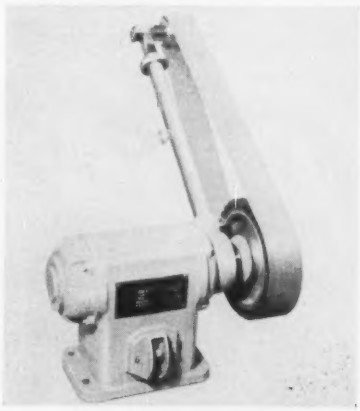


per axle. Platform sizes and lifting capacities are available for loads up to 100,000 lb. In operation, the platform is powered by a compact pumping unit that operates without air. Raised height of the basic unit is 64½ in. Lowered it is 4½ in. from floor to top of platform. Applications of the platform include moving work from one area to another, loading materials from one level to another, dock loading, bridging spaces between buildings and docks and handling heavy loads on production lines. Made by **Autoquip Corp.**, 1140 South Washtenaw Ave., Chicago 12, Ill.

For More Details Circle No. 447—Page 212

BENCH GRINDER

Lightweight, compact bench grinder for all types of grinding, polishing and deburring uses abrasive belts up to 2 in. wide x 48 in. long. Contact wheel is 6 in. in diam driven by a 0.6-hp motor developing a speed of 5100 sfm. Idler arm incorporates belt tracking and tensioning mechanisms and can be rotated



360 degrees around the spindle to provide operation in any position. For squaring, chamfering and beveling, a platen attachment is mounted directly to the idler arm and maintains its relationship to the abrasive belt without adjustment regardless of the position of the arm. Made by **Curtis Machine Division, Carborundum Co.**, Jamestown, N.Y.

For More Details Circle No. 448—Page 212

PLASTIC ALUMINUM

Plastic aluminum for repairing damaged castings or wood and metal patterns can be applied without heat. Within three hours after application, the plastic metal dries hard and can be drilled, filed, tapped or threaded. The repaired area will be watertight and withstand temperatures up to 600°F, it is claimed. The material is packaged in self-applicator 4-oz tubes, ½-pint or quart cans or in bulk amounts for large-scale use. Made by **Magic Iron Cement Co.**, 5403 Bower Ave., Cleveland., O.

For More Details Circle No. 449—Page 212

Literature for Foundrymen

BLAST CLEANING

Automated techniques for high-speed blast cleaning, construction features of Rotoblast units, layout aids and a section on abrasive coverage are presented in bulletin 703. Chart illustrates various types of automatic blast cleaning operations which can be adapted to a wide range of high-speed cleaning applications.—**Pangborn Corp.**, 1400 Pangborn Blvd., Hagerstown, Md.

For More Details Circle No. 450—Page 212

ACETOGEN GAS

Catalog describes Acetogen gas and lists its applications and advantages for cutting, welding, annealing, brazing, flame hardening, lead burning and scarfing. Equipment and accessories for use with the gas also are illustrated and described.—**Acetogen Gas Co.**, 20137 Sherwood Ave., Detroit 34, Mich.

For More Details Circle No. 451—Page 212

PROCESS EQUIPMENT

Material blending and heat transfer equipment are described in catalog 14. Three distinct types of blending equipment are available. Catalog includes selection tables for figuring standard dimensions and capacities for blenders. — **Patterson-Kelley Co.**, East Stroudsburg, Pa.

For More Details Circle No. 452—Page 212

MAGNETIC SEPARATORS

Design and application of high-intensity, induced roll magnetic separators are discussed in bulletin MIB-103. Operating characteristics, power requirements and shipping specifications of laboratory and industrial models are covered. — **Carpco Mfg. Inc.**, Box 3272, Jacksonville 6, Fla.

For More Details Circle No. 453—Page 212

ACCIDENT PREVENTION

Booklet, "Signs of the Times," explains why accident prevention is important to associations and outlines simple steps for association safety activity.—**Small Business Program, National Safety Council**, 425 North Michigan Ave., Chicago 11, Ill.

For More Details Circle No. 454—Page 212

IRON-POWDER ELECTRODES

Folder covers uses of iron-powder electrodes, their performance factors and American Welding Society specifications. — **Hoeganaes Sponge Iron Corp.**, Riverton, N. J.

For More Details Circle No. 455—Page 212

REFRACTORY PRODUCTS

Bulletin 200 offers detailed information on a complete line of refractory products for the foundry industry. It covers Hydrecon refractory castables, plastic firebrick, fire-

brick, specialty products, high-temperature mortars, refractory coatings, sealers and other, independent foundry products.—**J. H. France Refractories Co.,** 1914 France Rd., Snow Shoe, Pa.

For More Details Circle No. 456—Page 212

CONVERSION CHART

Chart contains data for converting old aluminum type designations to new designations. Also included are six other charts designed to aid in the selection of alloys and fluxes to weld, braze and solder aluminum. —**All-State Welding Alloys Co.,** 249-55 Ferris Ave., White Plains, N. Y.

For More Details Circle No. 457—Page 212

CONVEYING EQUIPMENT

Catalog 500 covers company's products including a totally enclosed bulk material handling system featuring a two-directional chain to convey in any direction and piano hinge steel belt conveyors, fixture welded.—**Prab Conveyors Inc.,** 30121 Groesbeck Highway, Roseville, Mich.

For More Details Circle No. 458—Page 212

NICKEL SILVERS

Manual, "Nickel Silvers," discusses the commercial grades, properties, forming, machining and finishing of the group of copper, nickel, zinc alloys called nickel silver. Selection data for specific applications are included.—**International Nickel Co.,** 67 Wall St., New York 5, N. Y.

For More Details Circle No. 459—Page 212

FOLDING CURTAINS

Folder provides design and construction features, installation details and general information on folding partitions that have a variety of industrial applications. — **Transwall Coated Products, Division of Bemis Bros. Bag Co.,** 610 South Fourth St., Minneapolis 15, Minn.

For More Details Circle No. 460—Page 212

HANDLING ATTACHMENT

Bulletin details company's push-pull loader with integral sideshift for palletless handling. Specifications are included along with a description of procedure for handling without pallets.—**Yale & Towne Mfg. Co.,** 11000 Roosevelt Blvd., Philadelphia 15, Pa.

For More Details Circle No. 461—Page 212

PHOTOELECTRIC CONTROLS

Applications of photoelectric equipment to industrial use include such jobs as counting parts, controlling doors, controlling bin levels, weighing automatically, providing smoke alarms and many others. Catalog 57 describes equipment available to do these jobs.—**Autotron Inc.,** Box 722-R, Danville, Ill.

For More Details Circle No. 462—Page 212

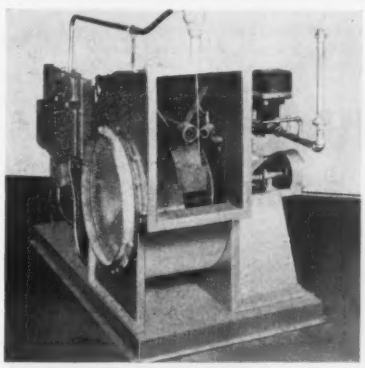
THREADED PLUG STOCK

Special alloy and processed cast iron threaded plug stock is reportedly finding use for tool and die repairs and other maintenance requirements. Made from close-grained cast iron, free from blow holes, the plug stock is heat treated and stress relieved for 45,000 psi tensile strength. Processed from 12 in. bar, threaded for 11 in. with ANC thread, the plug stock is made and stocked in eight diameters. Special sizes and diameters can be supplied in steel (alloy and low carbon) nonferrous and stainless steel. Made by **Claude Sintz, Inc.,** 1928 Stanley Ave., Detroit 8, Mich.

For More Details Circle No. 463—Page 212

PLANT HEATER

Direct-fired gas heater combines fan and mixing chamber into one compact unit and is said to be effective as a makeup air heater in areas where processes require large



exhaust loads as in foundries. Heater unit is available in sizes up to 100,000 cfm and 10,000,000 Btu. A convection type oven heater unit is said to be effective in heating operations for intake air temperatures up to 700°F. It circulates heated air through the oven with accurate control over temperature and oven ventilation. Sizes range to 35,000 cfm and 8,000,000 Btu. Made by **David-Ludwig Co.,** 14290 Goddard, Detroit, Mich.

For More Details Circle No. 464—Page 212

IMPACT WRENCH

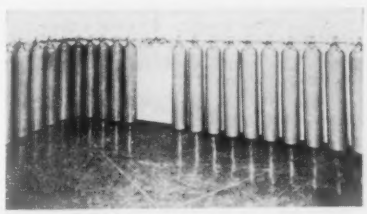
Manually operated impact wrench can deliver torque values up to 20 times that applied to the handle by the operator, allowing an operator to tighten to practical tensions bolts up to 1¾ in. in diam. As the impact force can be controlled through a spring setting, any desired bolt tension can be produced through control of the impact force and the number of impacts applied to the fastening. The wrench has two drive extensions, one for loosening and one for tightening, and is used like an ordinary ratchet wrench, using standard sockets to engage the nut or head of the fastenings. As the handle is pulled, a spring and rotor mechanism delivers rotary hammer blows or impacts automatically through the socket to the fastenings. One impact

is delivered for every 30 degrees of movement of the handle. Three models are available. Model 500 fits ½-in. sockets, takes a range of bolts through ¾-in., is 11 in. long and weighs 4½ lb. Model 750 fits standard ¾-in. sockets, takes a range of bolt sizes from ½ through 1¼ in., is 16 in. long and weighs 10½ lb. Model 1000 is designed for 1 in. sockets and bolt sizes up to 1¾ in. Made by **Swenson Engineering,** Box 43, Branford, Conn.

For More Details Circle No. 465—Page 212

OXYGEN MANIFOLD

Oxygen cylinder manifold is designed to handle an unlimited number of cylinders. As a basic unit, the manifold accommodates two cylinders, one on each side of the operating controls. Straight or curved extensions are added in single or double rows to either bank to permit manifolding any number of cylinders. One bank can be operated independently while cylinders in the other bank are in reserve or being changed. Manifolds are available for water or oil-pumped inert gases,



for high pressure fuel gases and for liquefied petroleum gases. Made by **Linde Air Products Co., Division of Union Carbide & Carbon Corp.,** 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 466—Page 212

PLASTIC SPRAY

Acrylic clear plastic for brushing, spraying or dipping is said to be effective as an insulator. Can be used as a sealer for wood, concrete, fabrics and metals against water, acids, vapors or salts. It stops and

Ask Standard

how to

cut costs

with

conveyors

Standard limit-switch-controlled Automatic Reciprocator is one of two used to form 200-ft. overhead detour of dehumidifier assembly line.

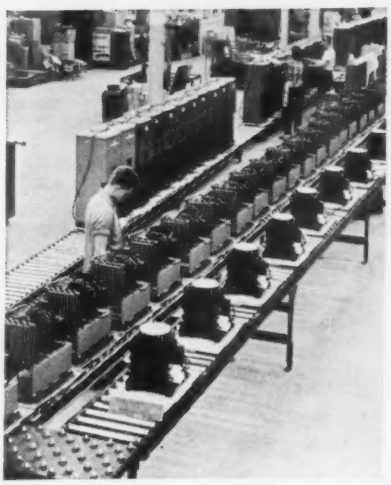
"COMPLETE CONVEYORIZING" ...what it did in a smaller plant

Products at Ebco stay on conveyors until packaged and sent to shipping.

Ebco Manufacturing Company — employing 275 people to produce water coolers, beverage dispensers and dehumidifiers — has realized substantial savings by completely conveyorizing their operations. Ebco engineers planned for an orderly conveyor system when developing plant layout and building design; consequently conveyor system costs were kept "low" and resulting efficiency is "excellent."

Similarly, it will pay you to take another close look at your present conveyor system. Standard specialists will be pleased to help you make evaluations ... recommend the proper equipment and its application to meet your specific needs.

STANDARD CONVEYOR COMPANY, North St. Paul 9, Minnesota. Sales and Service in Principal Cities.



Gravity roller conveyors like this, used for Ebco's assembly lines, are inexpensive, easy to set up, and economical to maintain.

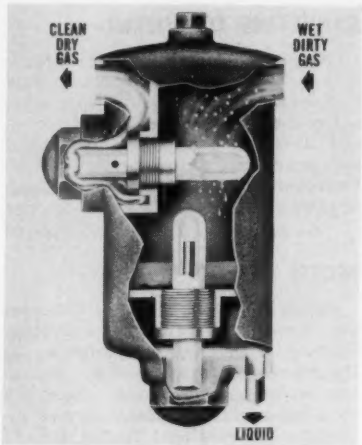
For details on Standard Conveyors of all types, contact the Standard representative listed in your classified phone book or write direct. Ask for Bulletin N-4.

prevents corrosion or oxidation of all metals. Serves as a bond and insures a smooth finish of green sand foundry molds. Protects blueprints, instructions, tags, pictures or art work from water, grease, dirt, stains or smudges. Made by **Crown Industrial Products Co.**, 816 Amsterdam St., Woodstock, Ill.

For More Details Circle No. 467—Page 212

SEPARATION DEVICE

Liquid-gas separation device for removal of entrained liquids and solids from air, gas and steam systems is available in 12 standard sizes. The Liqui-Jector, as it is called, operates



by phase separation, trapping solids and passing liquids in one direction and gas in another, without interrupting the flow through the line. Three standard models can be supplied: Series A for static volumes up to 100 cfm gas at 150 psi, Series B for static volumes up to 7000 cfm gas at 200 psi and Series C for conditions where unusually large volumes of condensate are encountered. Made by **Selas Corp. of America,** Dresher, Pa.

For More Details Circle No. 468—Page 212

SPECTROMETER

Direct reading spectrometer maintains optical stability despite variations in laboratory temperature. A patented automatic servo monitor keeps the unit's optical system in alignment at all times, and spectrum shifts of less than 0.0002 in. readily are detected and corrected. Operation of the servo monitor is based on use of a mercury arc light source emitting a beam which follows along the same path as light from the spark gap. A mercury spectrum line falls on a special slit-photomultiplier device which detects displacements of the line from a balance point on the slit. When the mercury line is on

MEMO
I wonder if a longer electrode would prove more economical?
MEMO
Let's call Great Lakes Carbon--they've always been helpful, and they're good people to work with!

ELECTRODE GLC® DIVISION

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dust and fumes ... no problem

in famous foundries served by

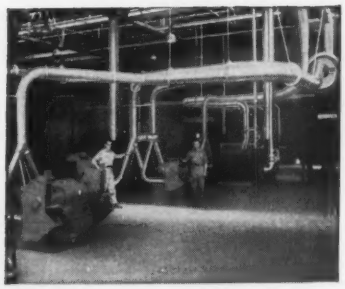
KIRK & BLUM

dust and fume control systems

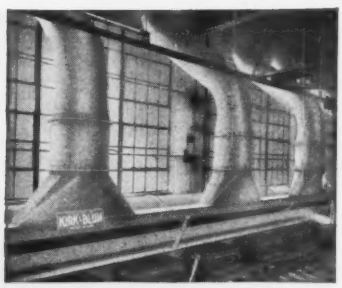
When a "dirty" foundry becomes "clean", important differences soon become apparent in worker efficiency, in maintenance and housekeeping costs, and even in plant-community relations.

If dust or fumes are a problem in your foundry, call on Kirk & Blum for the *complete* job—design, fabrication and installation. From 49 years of experience, Kirk & Blum engineers will be able to show you comparable problems efficiently solved the economical way.

For further details and illustrated booklet, write today to: The Kirk & Blum Manufacturing Company, 3239 Forrer Street, Cincinnati 9, Ohio.

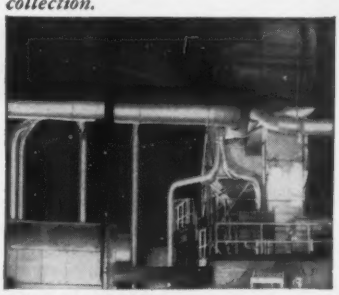


● **GRINDING**
In the chipping and grinding departments, Kirk & Blum systems control dust; dry collection.



● **POURING**
"Moving Floor" pouring station. Forty-foot-long Kirk & Blum hood effectively removes fumes as they are formed.

● **SHAKE-OUT**
Clean air flows over the shake-out grate, removing dust below the operators' breathing level; wet collection.



● **SAND HANDLING**
Equipment is efficiently exhausted by a Kirk & Blum system; wet collection.

the balance point, all spectrum lines used in the analysis will fall in the centers of their respective exit slits. Made by **Baird Associates—Atomic Instrument Co.**, 33 University Rd., Cambridge 38, Mass.

For More Details Circle No. 469—Page 212

SAFETY HATS

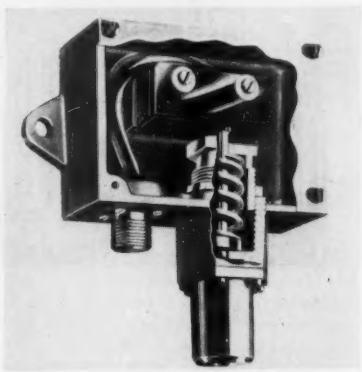
Fully resilient, fiber glass reinforced safety hats and caps meet federal specifications tests for im-

pact, penetration, electrical resistance, flammability and water absorption. One size, flexible, polyethylene suspension cradle fits all shapes and sizes of heads. Winter liners are available. Both hat and cap are available in wide range of colors. Made by **Welsh Mfg. Co.**, 15 Magnolia St., Providence, R. I.

For More Details Circle No. 470—Page 212

PRESSURE SWITCH

Switch operates on hydraulic or pneumatic pressure from 0 to 1200 psi and will withstand pressure as high as 3000 psi without distorting its pressure element, according to the manufacturer. The switch is adjustable over its entire range, and adjustments can be made without interfering with the pressure element.



Made of cast aluminum or stainless steel, the unit is totally enclosed and weatherproof. It uses any microswitch, 15 amp, 120 to 160 v, ac, with single pole double throw contacts. The switch can be wall or bracket mounted in any position. Made by **Alloy Bellows Engineering Co.**, 18125 Roseland Rd., Cleveland 12, O.

For More Details Circle No. 471—Page 212

FIST-FULL OF EASY READING FOUNDRY INFORMATION

Valuable data on the properties and uses of foundry alloys are available to all foundrymen, without charge, from ELECTROMET's extensive technical library. ELECTROMET's easy-to-read booklets list the advantages of the different foundry alloys and recommend the best practices for using them in the production of cast iron, steel, or non-ferrous metals. For the stainless steel foundries, there are also some useful booklets on the latest stainless steel melting practices.

Choose the booklets that will help you and circle the appropriate numbers on the handy ordering coupon below. To get a complete list of ELECTROMET's foundry literature, circle F-6924 on the coupon.

ALLOYS FOR ALL FOUNDRIES

"Electromet" Ferro-Alloys and Metals. A catalog showing the advantages and uses of all ELECTROMET foundry alloys. Circle F-2495.

IRON FOUNDRIES

"SMZ" Alloy—An Inoculant for Cast Iron. Circle F-4604.

Briquetted Alloys for the Iron Foundry Industry. Circle F-3465.

Chromium in Cast Iron. Circle F-2465.

STAINLESS STEEL FOUNDRIES

Observations of Stainless Steel Melting Practices. Circle F-20,006.

Oxygen Blowing Rate in Stainless Steel Melting. Circle F-20,032.

Effect of Oxygen Input Rates in the Decarburization of Chromium Steel. Circle F-20,040.

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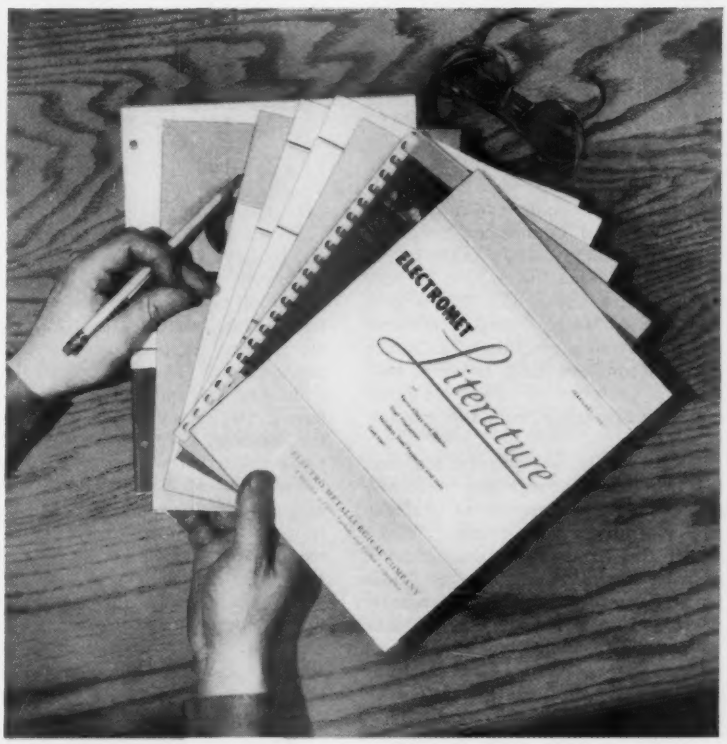

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Steady Progress Marks History of

West Coast Foundry

By DEWAR FORBES

Placing large cores in a pit mold is a delicate operation

ONE of the leading foundries in the greater San Francisco area is H. C. Macaulay Foundry Co., Berkeley, Calif. Quality gray iron castings have been produced there since 1896.

Berkeley is a foundry center of some note: Steel, gray iron, and nonferrous castings are produced inside its borders. In addition, the University of California at Berkeley has a department of foundry instruction and is a participant in the Foundry Educational Foundation program.

The Macaulay foundry is the oldest in Berkeley and the second in size in the entire Bay area. The largest is General Metals Corp., Oakland. Castings from a fraction of an ounce up to 12 tons are made either to customer's patterns or from patterns made by Macaulay from the customer's blueprints.

Macaulay Co. is a jobbing foundry, but in a walk through the plant one comes across row on row of intricate core assemblies for motor blocks which the firm has made, complete with patterns, for many years. These blocks are for Offenhauser engines, previously made by Meyer & Drake Engineering, Indianapolis. For a number of years the winner of the 500-mile Indianapolis race has driven a car with a Macaulay block.

Markets Are Widespread—Another group of notable core assemblies is for Hall Scott Motor Division, Berkeley, which makes a special line of truck motors. Hall Scott engines won wide acclaim for their performance during the last war. These rows of core assemblies give one the idea that he is in an automotive foundry until he learns of all the other types of castings made in the plant. Actually, production work is carried on for many leading firms all over the country.

A prowl through the pattern storage tells the story of the variety of castings the foundry has produced through the years. Pumps, gas, diesel and steam engines, electric motor castings, sawmill and mine machinery of all kinds, agricultural machinery and burglarproof safes are representative of the equipment for which the company has produced castings.

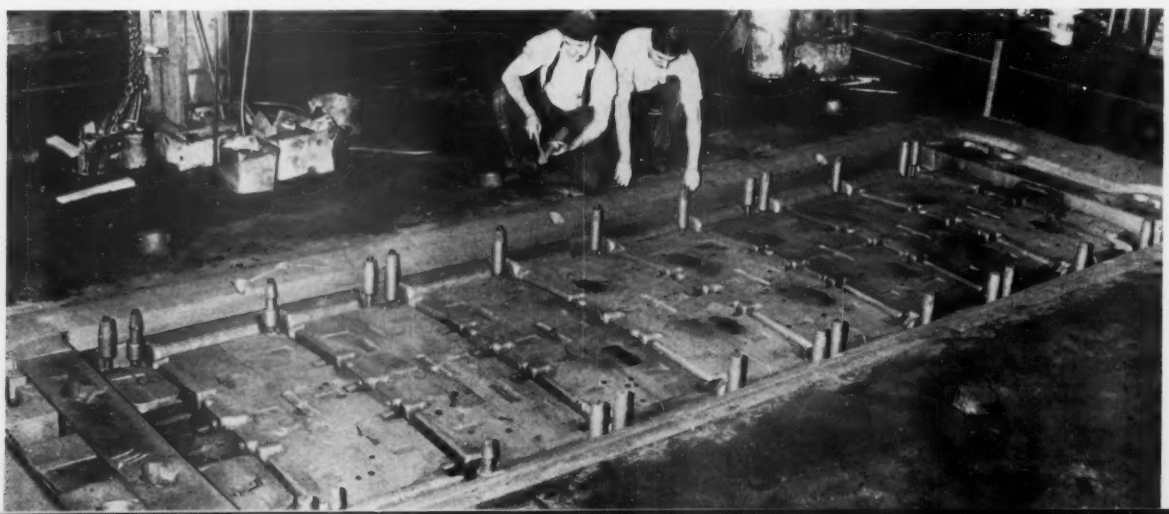
A gas engine cast at Macaulay Co. powered the first plane to cross the Atlantic Ocean.

The general manager is Earl Paltenghi, whose father, the late Louis Paltenghi, was a valued employee for 36 years. Mr. Paltenghi has been with the firm since 1938.

General superintendent is Leroy Kalin, a quiet-spoken gentleman who left the patternmaker's bench nine years ago.

George McDonald heads the sales engineer group. Mac's background as

View of the completed pit mold shows cores in position



Progress Report:

SCHRADER AIR PRODUCTS CAN MAKE PRECISION OPERATIONS EFFICIENT

● Let's clear the air about close tolerances

We've faced it. Lots of manufacturers still think air is as unpredictable as the weather report. But others know better, because they've taken the time to let a little sunlight on the subject. These open-minded ones are utilizing Schrader Air Products, not just to hold work or blow away chips, but to produce complex units to close tolerances.

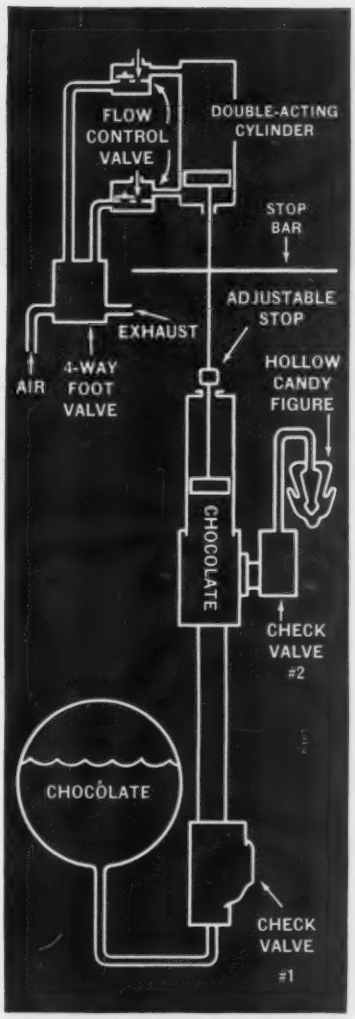
Air is a big boy now. It has grown up fast because automation came because pennies needed pinching. Because many operations in manufacturing turned out to be just plain dangerous. Then engineers found air was not only efficient, economical, and safe, but that products were already designed and produced to make air a logical way of performing hundreds of special jobs.

FOR EXAMPLE:

● Sweet words about air from a candy maker

At a Buffalo, New York, candy company, Schrader Air Products have been used to perform a complex measuring operation. To within one gram! Six Schrader double-acting cylinders are used to fill a bank of six more single-acting cylinders with a prescribed amount of chocolate. When a foot valve is released, the chocolate is forced into wax figurines, exactly filling them. And the entire installation is even covered and kept at a constant temperature to insure the proper chocolate viscosity.

Take a look at the schematic. It shows the arrangement by which the Schrader Air Products are adapted to an operation which might at first seem far outside the limits of air use. It was possible because some engineers put on their thinking caps.



Schematic shows how Schrader Air Products are adapted for precision handling of liquid chocolate.

● Talk about air's advantages being automatic—lend an ear

This is important to you, so don't wander off. When air is used to synchronize motions automatically, efficiency is almost sure to follow. BUT, the natural advantages of air multiply like rabbits. For instance, economy is basic. In many cases it can make the difference between profit and loss. Then, safety margins are widened by the use of special control techniques. Air's simplicity makes possible easy finger-tip and tip-toe operation of tiring hand and foot movements. Fatigue? Who's tired? Production goes up. Modern packaged control sets are so highly developed that most hazards of press operation are no longer applicable. Both hands must be used at once, and cannot stray into danger zones. Any machine using a mechanical clutch, shears, brakes and friction clutches can use special controls.

● We <u>like</u> to be taken advantage of

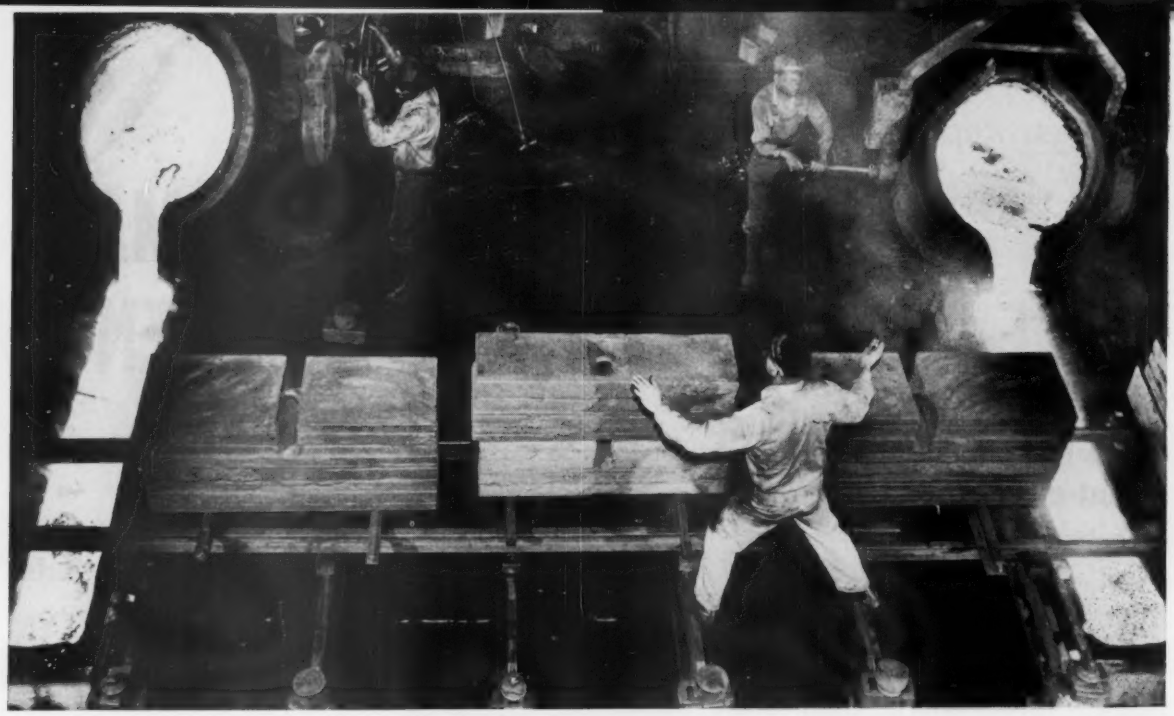
You can make use of Schrader's engineering facilities. That's why we *have* them. Upon request, Schrader engineers will assist in planning for the most efficient use of air in your plant, and in selecting the products best suited to a given application. Distributors are conveniently located to deliver Schrader Products in the shortest possible time.

Write to Schrader for information. Address A. Schrader's Son, Division of Scovill Manufacturing Company, Incorporated, 465 Vanderbilt Avenue, Brooklyn 38, N. Y.

Schrader®
ESTABLISHED IN 1844

FIRST NAME IN THE USE OF AIR
FOR INDUSTRIAL PRODUCTION AND CONTROL

Circle 685 on Inquiry Card—Page 51



Large mold is poured with two ladles at opposite ends

a patternmaker provides for efficient service to customers. He keeps in close touch with the pattern shop when customer's patterns are being made.

Harold E. Henderson, whose "Meditations of a Sandman" is a feature of FOUNDRY, is in charge of sand control. He is continually trying out new ideas in his sand laboratory. Mr. Henderson began at Macaulay Co. in 1910 as an apprentice molder. Except for time off to work as a journeyman in Australia and other places and on a government assignment in Turkey several years ago, he has spent his entire working life at Macaulay Co.

Besides his sand projects, Mr. Henderson acts as bird dog for the company, picking up new ideas at foundrymen's meetings and plant visits. These ideas are given careful analysis and if found practical are put into operation to keep up the firm's slogan, "When better castings are made, Macaulay's will make them."

A brother of Harold Henderson, the late C. M. Henderson, former general manager of Macaulay Co., founded the Northern California Chapter of the American Foundrymen's Society and was active in all its work until his death. Harold took up where his brother left off and has been a director of the chapter for several years. This year he is chairman of the group.

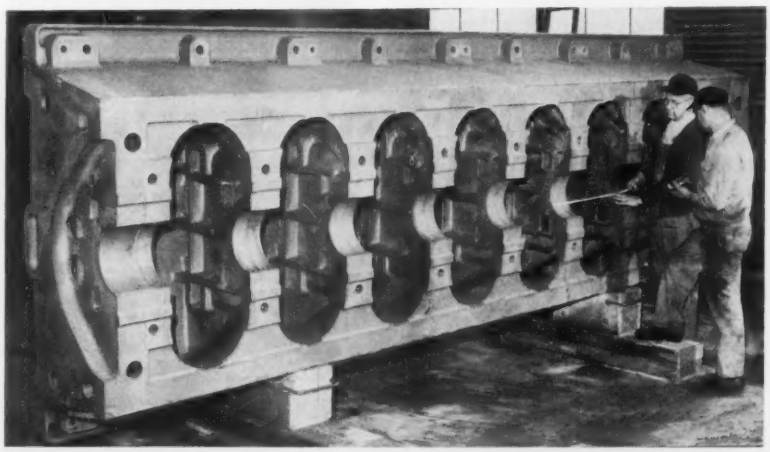
Macaulay Co. always has been strong on technical education in the foundry, in accordance with the ideas of Mr. Macaulay. Early in life he concerned himself with problems of the cupola and scientific principles involved in the foundryman's art. Today, in the metal laboratory, chemical and physical analyses of castings are controlled. Customers have only to specify the class of castings required from the standpoint of strength, machinability, etc., and Macaulay Co. is equipped to do the rest.

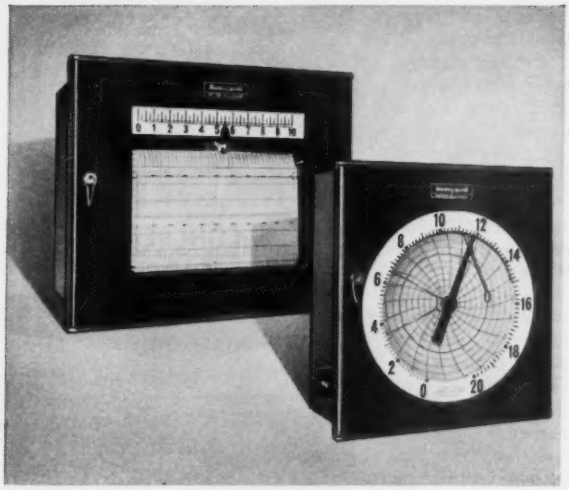
How It Started—The career of the late Henry Clayton Macaulay reads like a fairy tale and proves what can be accomplished in this country when courage, hope and hard work are combined. Mr. Macaulay was born in Providence, R. I., on June 5, 1854. His mother died when he was three years old, and he, with other members of the family was placed in an orphanage.

When he was 16, he went to Boston, where he became an apprentice molder. He seems to have taken an unusual interest in foundry work from the very beginning. Technical education had not been introduced to the foundry in the 1870s, and problems had to be solved by trial and error. An apprenticeship of seven years was required.

In the early 1870s, as a journeyman, Mr. Macaulay started traveling about, in part to get rid of a bad attack of rheumatism. We find him first working in Canada at Brockville, on the banks of the St. Lawrence River. The next stop was at New Orleans. Then he went to Belize,

Weight of diesel engine bed plate casting is 12 tons



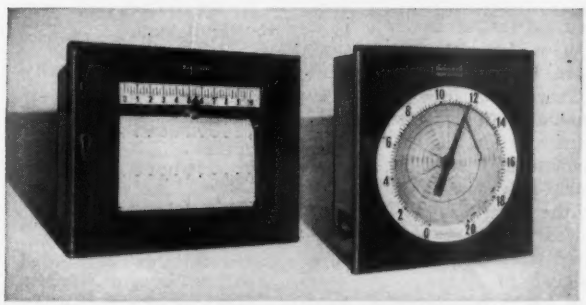


Precision Class 15 Line of *ElectroniK* instruments. Calibrated accuracy, ± .25% of span. Complete selection of many types of indicating and recording models, including electric and pneumatic controllers of most advanced type, and multipoint monitoring or recording of 2 to 400 points.

for accuracy, versatility, price

. . . Let your application decide which Honeywell instrument

fits your needs



Special Class 14 Line of *ElectroniK* instruments. Calibrated accuracy, ± .5% of span. Priced lower than the Precision line. Strip chart and circular chart instruments, circular scale indicating controllers. With various types of electric control.

Millivoltmeter Instruments. Dependable, accurate service at low cost. Plug-in unit design speeds servicing. *Pyr-O-Vane* controllers, in either horizontal or vertical case, offer snap-action or time-proportioning electric control.

No need to "shop around" for instrumentation to fit your temperature measurement or control problem. From the Honeywell line—the most complete and diversified in the industry—you can be sure of getting exactly what your application requires.

Your local Honeywell engineer will be glad to consult on your requirements. Call him today . . . he's as near as your phone.

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First in Controls

ABRASIVE shot and grit, made here in the town of Springville, New York, is a specialty of ours, and we're more than a little proud of the fact it is famous for its fine quality. Our . . .

SHOT, whether it's steel or malleable, chilled iron or cut wire, is being used in tonnage quantities by some of the world's leading foundries and metalworking plants . . .

AND we never let the demand for our metallic abrasives lessen our constant watchfulness in the laboratory to make sure that quality is maintained. We strive for complete uniformity, economy and efficiency in making shot and . . .

GRIT. If you are having abrasive trouble, perhaps we have the answer here in Springville. Write us; you'll be in good . . .

COMPANY. A new catalog is available on request; just drop us a note.

ABRASIVE SHOT AND GRIT CO., INC.

Springville, New York
Telephone: Springville 1

Circle 687 on Inquiry Card—Page 51

capital of British Honduras, and from there to Tegucigalpa, capital of Honduras. It was in Tegucigalpa that he got rid of his rheumatism.

Extensive gold and silver mines were situated in that region. On one occasion, a large gear broke in some hoisting machinery, causing a complete shutdown. Mr. Macaulay put together a small cupola, adapted the broken gear for use as a pattern and produced a good gear.

From Honduras he went to Phoenix, Ariz., and thence in 1889 to San Francisco, where he went to work as a journeyman in National Foundry. There he became acquainted with John Lauffer, a bright lad of 17 who, like Mac, was concerned with nothing but foundry work, and the two became good friends. Mr. Macaulay worked here and there in the foundries of the area and in time became foreman of Byron Jackson Foundry.

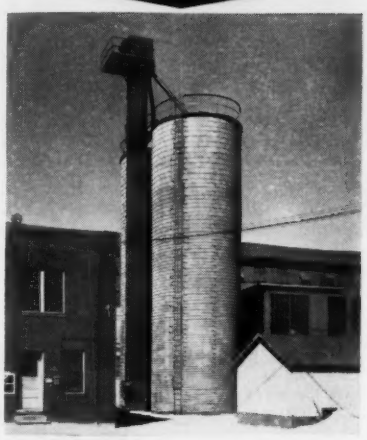
In 1896 Mr. Macaulay and John Lauffer became owners of the foundry on a shoestring, and for ten years they carried on with great success. Then, on April 18, 1906, the San Francisco earthquake and fire occurred, and their foundry was completely destroyed. The heat of the fire was so great that their stocks of pig iron were melted. All that was saved was some scrap iron, mold weights, binder and a core oven.

The two molders could have been dealt a knockout blow, but they were only down, not out. Packing their few possessions in a horse-drawn wagon, they crossed San Francisco Bay to Berkeley. There, on borrowed money, they obtained a small piece of land in their present location and on more borrowed money they built a rough shed. In early July, less than three months after the April disaster, and before there was a roof on the building, they poured their first casting. Thus Macaulay's of Berkeley was born. As the years rolled on, it had a history of continual expansion, and the end is far from having been reached.

". . . and he's so proud of his work he brings most of it home."

The RIGHT Answer to Your BULK STORAGE Needs:

MARIETTA CONCRETE SILOS



Eliminate molding sand waste and costly handling methods with a MARIETTA storage system engineered to your foundry operation.

Marietta silos are economically erected in any desired capacity . . . any number of units. Interlocking concrete stave construction provides safe, dry storage . . . resists wind, shock or fire . . . requires a minimum of maintenance.

Conveyors, feeders, discharge systems or other auxiliary equipment for your particular material handling requirements can be mounted on the sturdy walls of a Marietta silo.

Depend on Marietta's 41 years of experience to design and erect the most efficient storage system for your need under one cost-saving contract. No delays due to critical material shortages with a Marietta installation . . . erection is quickly and efficiently handled by factory trained personnel.

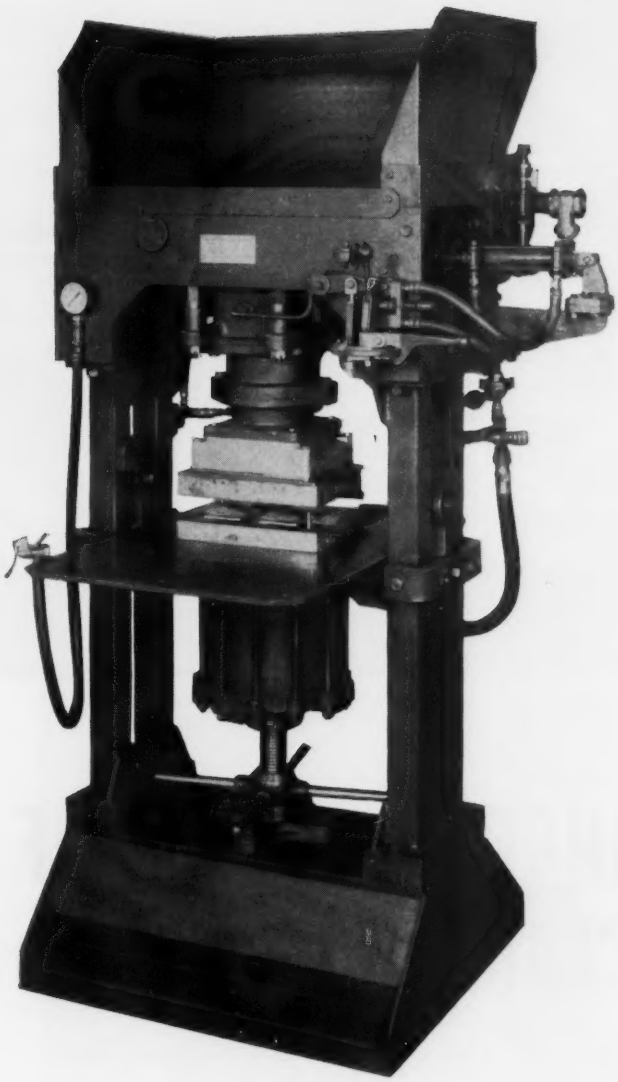
Write for Marietta's Modern Industrial Storage Systems Booklet and the right answer to your bulk storage problems.

THE *Marietta* CONCRETE CORPORATION
41 Years Know-How in Pre-Cast Concrete Construction
Marietta, Ohio

BRANCH OFFICES: Baltimore 21, Md., Charlotte 6, N.C., Nashville, Tenn., Jamestown, N.Y.

Circle 688 on Inquiry Card—Page 51

Redford No. 4-D DRAW TYPE CORE BLOWER



Designed primarily to fill the need for a fast and flexible draw type machine to handle work from a few ounces to 10 lbs., the Redford #4-D can be quickly adjusted to accommodate core boxes not requiring the draw feature, or can be equipped with a clamp to handle vertically parted core boxes.

Rugged construction, simplicity of change-overs and a fast operating cycle make it suitable for either jobbing or high production work.

Exhaust air is utilized to thoroughly fluff the sand remaining in the sand magazine after each blow, thus reducing the possibility of cratering.

The stationary sand magazine and accurately guided draw table assure perfect drawing of the cores. Vibration of the core box is automatic.

Magazine heads normally furnished with the #2 Redford machine can be used with the #4-D Redford. Larger new type magazine heads especially suited for draw type work are also available as standard equipment.

Valves are designed to assure maximum safety. The operator must use both hands at the same time in order to clamp the core box.

The Redford #4-D has been thoroughly proven in both small and large foundries. To get complete information write for Bulletin 4-D.

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

SHELL CHEMICAL CORP.—Working in the processing area of this huge Shell plant, a Clarklift rushes boxes of synthetic rubber to shipping area. Commented the foreman, "I like this truck for a lot of reasons but mainly because it's fast and easy to operate . . . especially in tight areas."

HERE'S WHAT LOS ANGELES THINKS OF THE NEW CLARKLIFT

There's a gold rush of industrial growth here in Los Angeles. Last year, 123 new industries entered the area—$344 million was invested in industrial expansion.

Although this remains a land of sunshine and relaxation—there's a rush for ultimate efficiency in operation. Any method that will cut overhead and operating costs looms in importance. It's why eyes opened wide when the new Clarklift came West.

For Clarklift is news to efficiency-minded management. From the marvel of a longer wheel base with a *shorter turning radius*, to the speed and convenience of finger-tip controls, the Clarklift offers more practical design innovations than a half-century of fork truck development has produced.

Superintendent Orovic of American Hardwood Company summed up the general opinion with, "We needed a lift truck that could keep pace with our growing business. We looked over the whole field . . . decided the Clarklift line was our best dollar investment."

How about your company? For details call your local Clark dealer or write us direct. On request, we'll arrange a demonstration in your plant.

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 16, Michigan

CLARK® EQUIPMENT

CLARKLIFT is a trademark of Clark Equipment Company

SIGNAL TRUCKING SERVICE LTD.—"We have over 880 pieces of equipment in operation—we handle thousands of rail cars a year," said John E. Carroll, Jr., Vice President. "Of necessity, we depend heavily on fork trucks. That's why we bought these new Clarklifts. They're outstandingly dependable, easy to operate, and what's more, our local Clark distributor gives us excellent and reliable service."

SMART & FINAL IRIS CO.—"High product damage could be disastrous in our business—after all we handle over 17 million cases of food and sundry items a year," commented John C. Woods, Vice President. "That's why we like our Clarklifts . . smooth, safe controls—much faster lifting speeds. Efficiency like that saves us dollars."

LOCKHEED AIRCRAFT CORP. "Jet engines are heavy, but delicate. That's why the precise inching and sensitive controls of this truck are important to us."

AMERICAN HARDWOOD COMPANY. "Sure I like this truck—best one I have ever driven," commented the driver. "It's easy to drive, easy to get on and off and there's no clutch pedal. I have to move a lot of lumber in a day—this Clark truck makes it simple to do."

Circle 653 on Inquiry Card—Page 51

TAYLOR & BOGGIS
USES 18% LESS SAND
SAVES LABOR WITH...

Cleveland
FLAT COIL
CHAPLETS

Note clean chaplet breakoff on end bell hub which reduces cleaning operations.

Due to their low cost, Taylor & Boggis also uses flat coil chaplets for soldiers in deep green sand core pockets.

Only 1/2" to 1" of sand cover is required in the cope for firm support of these end bell core chaplets. Flasks are lighter and 18% less sand is handled on the end bell mold line.

In addition to providing positive core support, Cleveland Flat Coil Chaplets speed molding at Taylor & Boggis due to uniform stems and plating thickness. Check today for details on flat coil chaplet advantages in your molding lines.

Write today for *sample* and catalog!

Cleveland Since 1890

CHAPLET & MFG. CO.
26471 LAKELAND CLEVELAND 32, OHIO

Circle 692 on Inquiry Card—Page 51

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Change"

WE MAY assume with considerable confidence that "Change is one of Nature's mighty laws." Man is a comparatively recent inhabitant of this world, and he may prove only of transient importance here, however important he rates in his own estimation.

Those of us in the foundry fraternity have not always enjoyed the dignity of full partnership in the family of mechanical arts. In the industrial revolution, we found ourselves relegated to a place of comparative obscurity, due largely to our complacent attitude toward anything resembling change.

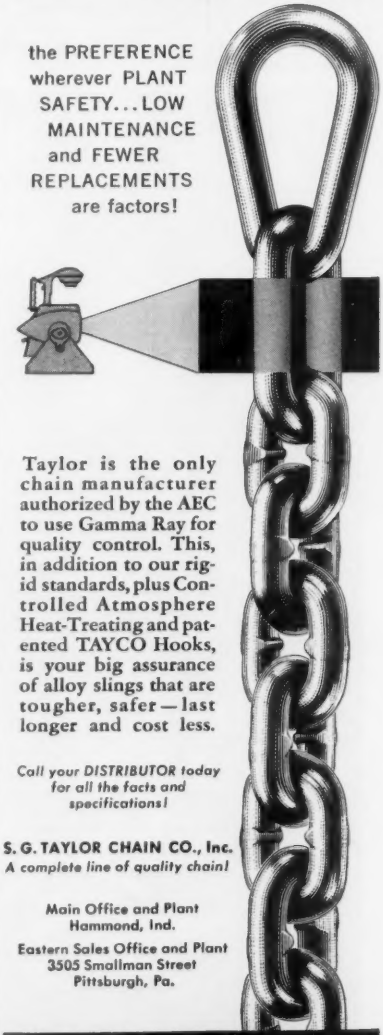
For centuries, foundrymen were completely consistent and obdurate in maintaining their standard procedures. Other industries mechanized and modernized in a frenzied search for new and better ideas, methods and applications. The foundry, however, clung to its screen, shovel and horse manure. Of course, there were exceptions to this gloomy picture, but, for the most part, foundrymen insisted, "The old shop and methods were good enough for father and grandfather, and, by golly, they're good enough for me!"

Despite all this, we since have unquestionably been carried forward in the changing current of human affairs and have at last achieved a very respectable degree of recognition. However long arrested, progress defies man's apathy. It remains unpatented, available to all ambitious citizens.

When we think of progress, we invariably associate it with some sort of change—in medicine, machines, mothballs or anything else. If you are fortunate enough to be a sandman, completely dedicated to your exalted calling, progress can mean but one thing—improved sand practice! To this end, you devote every

NEW
GAMMA RAY
QUALITY CONTROL
on master, joiner and end links
makes TM
factory made
ALLOY SLING CHAINS

the PREFERENCE wherever PLANT SAFETY...LOW MAINTENANCE and FEWER REPLACEMENTS are factors!



Taylor is the only chain manufacturer authorized by the AEC to use Gamma Ray for quality control. This, in addition to our rigid standards, plus Controlled Atmosphere Heat-Treating and patented TAYCO Hooks, is your big assurance of alloy slings that are tougher, safer—last longer and cost less.

Call your DISTRIBUTOR today for all the facts and specifications!

S. G. TAYLOR CHAIN CO., Inc.
A complete line of quality chain!

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TAYLOR MADE
A GREAT NAME IN
Chain SINCE 1873

Circle 693 on Inquiry Card—Page 51

waking moment. Sand practice is a serious business.

If you are "synthetic" minded, you will select a grade of silica sand of grain-size, shape and distribution best suited to the type of casting under consideration.

To this you will add a proprietary material which purportedly improves the flowability and stability of the sand as well as the casting finish. You next introduce your selected clay or clays (all ratios by weight), a small amount of wood flour, sea-coal or pitch if desired and an amount of water which barely exceeds your optimum requirement.

Then, according to some proponents of synthetic practice, you have an ideal molding material. In my own experiments—which I confess were somewhat hasty—I have found the claims to be reasonably correct. I also found, however, that the proprietary material which I used (probably an inferior brand), was of a gummy, molasses-like consistency. It was difficult to handle and tended to waterproof the sand. I was warned that it would create excessive and unpleasant smoke or gas, but I did not experience this condition.

So much for one phase of synthetic practice. Now, purely in the interest of constructive controversy, let us consider that ancient product of nature, naturally bonded grain.

E. C. Sawyer, of Ayers Mineral Co., loyally insists that this sand, which was mulled and aged over a period of 4 million years (more or less), is somewhat superior to its synthetic rival, which boasts of a maturity achieved in a brief four-minute mulling cycle. Mr. Sawyer readily admits that nature didn't always do a satisfactory job and that some of her good deposits now are exhausted. He also concedes that distance and excessive freight rates make it imperative for many shops to resort to synthetic practice. But he still implies that usually we turn to the new because the old is not readily available. He also recommends a compromise, or what many foundrymen term a semisynthetic mix, in which bonded and unbonded sands are blended to produce a material of enhanced virtue and reduced faults.

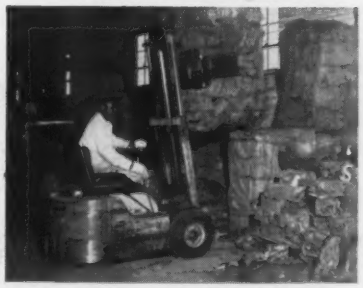
Synthetic versus naturally-bonded sand is a subject which will continue to excite and divide the minds of foundrymen (especially nonferrous) for some time ahead. I do not expect to live long enough to hear the debate concluded.

In my own rather limited experi-

SMELTER EFFECTS 91% MAN-HOUR SAVINGS UNLOADING SCRAP USING HYSTER LOAD-GRAB® CLAMP

Feeding a 600 lb. bale of copper shavings to a furnace.

Double decking drums filled with 2000 lbs. of brass ingots.



Stacking bales of yellow brass scrap saves space.

Using vertical storage space for a metal skip containing 1500 lbs. of scrap copper.

CHICAGO, ILLINOIS — Elesco Smelting Company has effected sizable cost reductions in their materials handling procedures by use of Hyster Lift Trucks and Load-Grab attachments. Where by former methods three men worked 8 hours (24 man-hours) to unload a car of scrap, now the lift truck and driver do the same job in 2 hours (2 man-hours)...a saving of 22 man-hours (or 91%).

Loading a trailer with ingots formerly required 3 men working 2 hours (6 man-hours); now the same men, using a Hyster Lift Truck get the same work done in 30 minutes (1½ man-hours)...a saving of 4½ man-hours (or 75%).

Both the 2000-lb. and 4000-lb. pneumatic tire Hyster Lift Trucks are kept busy throughout the day on all types of handling jobs. At night, when the furnaces are charged, both lift trucks are kept busy hauling scrap to the furnaces.

Other Hyster® Lift Truck procedures: unloading ferrous scrap metals, storing containers, feeding bales to furnaces, emptying slag pots, loading trucks with finished ingots.

Company officers state that considerable overall savings are achieved by Hyster methods as a result of better utilization of labor, time and space. Your Hyster Dealer makes it his business to keep up with materials handling progress in smelters and foundries. Call him today. He will help you to analyze and increase efficiency of your handling procedures.

Dumping a 4000 lb. slag pot.

Call your Hyster Dealer today. He is listed in your telephone directory under "Trucks-Industrial"

HYSTER COMPANY

HYSTER

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ence, I lean strongly toward a synthetic practice. Its history over the past 25 or 30 years, in thousands of foundries, running the entire gamut of casting production, has recorded an overwhelming vote of approval. During the past 13 years, my company has successfully made the transition from the old to the new practice. I wouldn't say that the experience was entirely painless, but I will say that it was always interesting, at times exciting and occasionally rewarding!

Man, like a pendulum, usually swings as far in one direction as he does in the other. When he takes the radical or extreme view on any subject, he certainly is likely to expose its strength or weakness in the least amount of time. The progressive foundryman is normally willing to try anything once, but unless the first result shows some promise, he will not mortgage his future on a will o' the wisp.

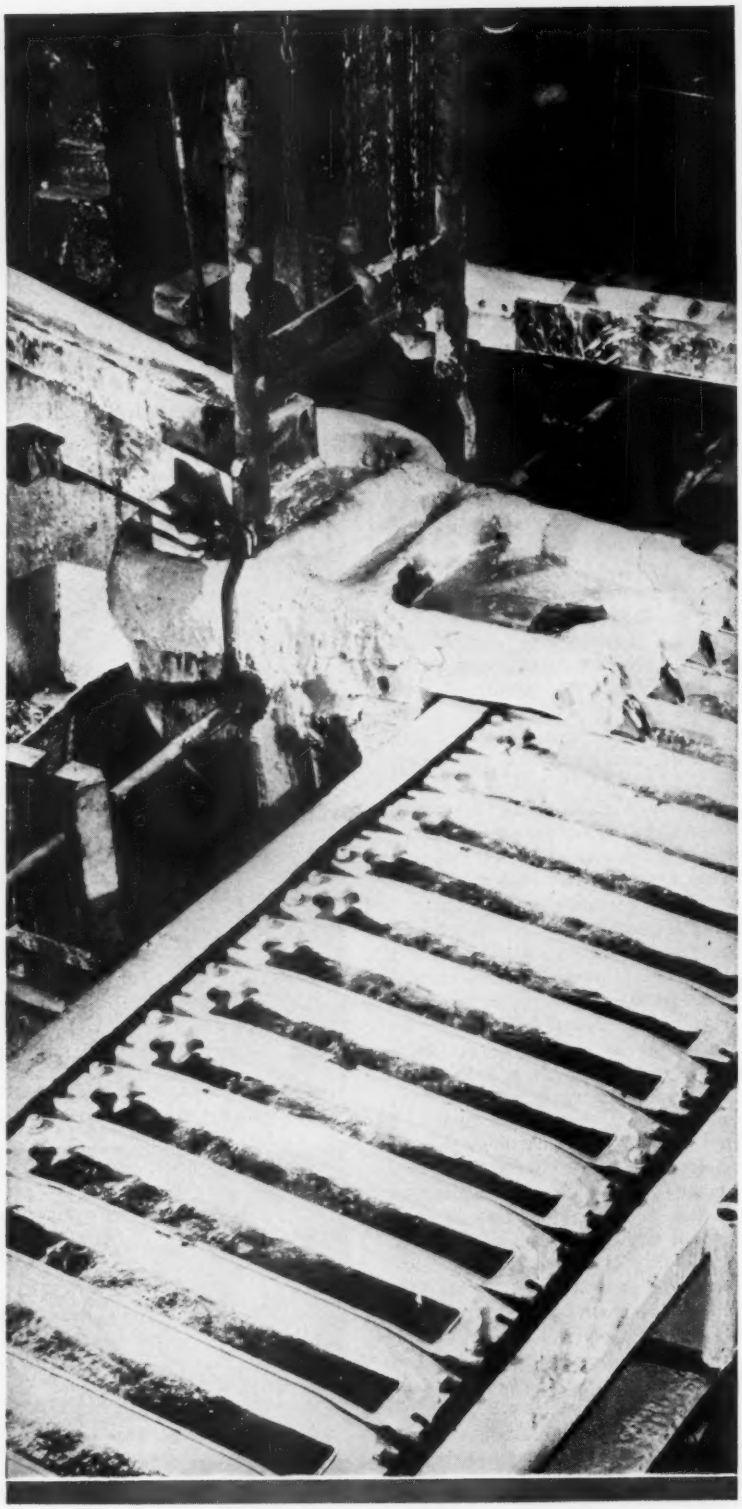
As I look back 40 years or more, I realize that I have been privileged to view but a small part of the changing foundry scene. Yet I have viewed many changes, with a never-ending wonder as to their possible or probable significance. Along with all the promise of miracle devices, trumpeting the golden era, there was an equal or greater number of Goldberg inventions which startled us temporarily, then disappeared—even from our fickle memories.

The nth degree of sand-casting finish has been attributed to the shell molding process (certainly synthetic), and the predominant amount of evidence supporting the shell claims is too convincing to be laughed off.

I tremble at my own audacity in making the statement, but I recently witnessed, in Fresno, Calif., the production of naturally bonded, green sand molds in which aluminum castings were made that fully equalled in appearance and fidelity to pattern lines any shell molded castings that I have ever seen. And certainly they were produced at much lower cost.

The figure and letter detail reproduced in this Fresno sand were minutely accurate, even though some of the inscription was so small that my aged eyes called for a reading-glass and even younger men, who boasted of 20-20 vision, were compelled to squint as they studied this bit of engraver's art.

Now, don't get me wrong! I am not recommending that you adopt this Fresno sand or practice. (Norman Dunbeck, Clyde Sanders, Charles Schureman, Frank Brewster, Jay



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Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

Myers, etc., etc., please note, and copy.) I fully believe that from present and future experiments we will be able to duplicate this Fresno job in synthetic green sand with a workable degree of scientific control —a procedure that can be taught to any muller man.

In Fresno, it is an art on a high plane, an art that cannot be transferred or bequeathed to another—an art that dies with the artist. But even during the life of the artist (master molder), the sand currently in use may become unobtainable, and the reputation for supreme quality will be doomed! Synthetic practice carries no such formidable threat.

Although I profess no prophetic talent, present evidence forces me to the conclusion that the potential values of synthetic sand practice carry the promise of a wide and lucrative market for the foundry of tomorrow.

State University of Iowa Offers Management Course

Its 18th management course will be offered by the College of Engineering, State University of Iowa, Iowa City, Iowa, June 10 through June 22, 1957. In the past, more than 1200 representatives of American and foreign business, industrial and governmental organizations have attended the course.

Scheduled material will include intensive instruction and a series of talks by recognized authorities on new developments, applications and problems in management techniques. The entire program is designed for individuals who need to use these techniques—factory managers, foremen, industrial engineers, methods and time-study analysts, cost men, office executives and others in related work.

Areas to be covered include production planning, job evaluation, motion and time study, wage incentives, plant layout, material handling, quality control, supervisory training, labor relations and legislation, organization and policy, and engineering economic analysis. These subjects are integrated under four major optional groups which provide accent on the needs of the individual. Special emphasis for all participants is placed on instruction in communications.

Inquiries concerning the course should be sent to J. Wayne Deegan, 122 Enginering Building, State University of Iowa, Iowa City, Iowa.

Federated Aluminum Alloys always conform to published Performance Specifications

If you have had reason to doubt the performance capacity of certain aluminum alloys, it will pay you to consult Federated before you re-design or substitute another metal.

Often the performance requirements of a part indicate that a certain aluminum alloy will do the job; yet in operation, the part fails. Costly re-design or a more expensive metal are usually relied upon to rectify the trouble.

All aluminum alloys should provide the characteristics set for them in published specifications. At Federated's three aluminum plants, rigid quality control insures that production ingot adheres exactly to specified content. Impurities are held at or below the minimum allowable percentage.

Every heat of every Federated aluminum alloy is tested exhaustively. Refining, alloying and testing techniques are under the supervision of ASARCO's Central Research Laboratory, where scientists can control metal impurities to parts per million, if required.

A Federated field man will be around to see you soon. Spend some time with him. It will benefit you.

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

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HOW DOES YOUR FOUNDRY GROW?

Through an increasing awareness of cast metals potential; through streamlined production methods; through continued research and new development.

Yes, these are the necessary growth factors. But they all stem from one source . . . sound, technical leaders and pre-indoctrinated customers.

The investment of the foundry industry in the student of today and tomorrow largely determines its potential. We cannot grow as an industry — or as an individual foundry — without soundly indoctrinated foundry technicians.

Through the efforts of the Foundry Educational Foundation, 31% of all engineering students at F.E.F. affiliated universities now participate in cast metals study. This means a large annual pool of capable producers for the foundry industry.

What are you contributing to that pool today, for your greater benefit tomorrow?

● *Write today for our detailed booklet, "Let's Look Ahead".*

Foundry Educational Foundation

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Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1954	623,054	156,555	214,407	245,291	.....
1955					
Dec.	74,791	14,655	25,046	34,484	123,881
Total	827,162	165,482	298,349	355,203	.....
1956					
Jan.	74,152	15,861	24,528	33,253	121,924
Feb.	73,096	15,560	23,963	32,949	115,958
Mar.	73,785	16,597	22,816	33,965	110,642
Apr.	67,880	14,732	20,718	31,782	106,477
May	65,786	15,570	19,699	29,814	102,121
June	58,189	13,448	19,067	25,027	102,068
July	52,955	12,398	16,388	23,491	106,620
Aug.	61,407	13,100	18,067	29,553	109,352
Sept.	62,503	12,354	17,855	31,640	111,785
Oct.	74,209	14,389	21,120	37,782	110,818
Nov.	69,741	14,333	20,673	33,929	113,356
Dec.	67,333	13,391	20,557	32,931	118,185
Total	801,036	171,733	245,451	376,116	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1954	812,016	461,982	.....	.....	.....	.....	.....
1955							
Dec.	99,946	60,409	.....	.....	.....	.....	123,107
Total	1,104,775	652,552	.....	.....	.....	.....	.....
1956							
Jan.	93,562	54,618	79,406	45,747	14,156	8,871	116,520
Feb.	93,533	54,466	80,601	47,606	12,932	6,860	113,616
Mar.	86,941	46,266	75,384	40,869	11,557	5,397	106,491
Apr.	83,320	47,064	72,763	41,449	10,557	5,615	99,573
May	80,138	51,053	69,593	44,424	10,545	6,629	93,677
June	75,635	45,022	66,300	26,791	9,335	5,513	86,247
July	54,340	31,300	45,977	26,881	8,363	4,419	92,078
Aug.	74,422	43,479	62,867	36,759	11,555	6,720	91,883
Sept.	69,380	41,902	59,071	35,534	10,309	6,368	92,553
Oct.	81,528	50,219	68,769	43,109	12,759	7,110	92,734
Nov.	82,717	47,979	68,549	40,107	14,168	7,872	89,977
Dec.	76,352	44,268	63,625	37,569	12,727	6,699	92,311
Total	951,868	557,636	812,905	466,845	138,963	78,073	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1954	834,668	751,917	48,848	.....
1955				
Dec.	88,167	78,204	6,373	57,241
Total	1,008,898	905,867	63,111	.....
1956				
Jan.	89,767	80,116	6,135	58,445
Feb.	91,706	82,244	5,888	57,515
Mar.	96,085	85,094	6,299	65,560
Apr.	90,679	81,333	5,835	68,106
May	89,188	80,105	5,448	58,789
June	78,921	70,260	5,052	55,019
July	60,926	55,027	3,193	59,661
Aug.	77,619	70,479	3,805	56,364
Sept.	72,109	64,887	3,930	56,990
Oct.	81,049	73,058	4,104	54,363
Nov.	72,866	65,022	4,114	52,643
Dec.	65,198	57,929	3,769	56,556
Total	966,113	865,554	57,572	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1954	25,777	22,950	.....
1955			
Dec.	2,253	2,016	5,981
Total	27,854	25,294	.....
1956			
Jan.	2,959	2,600	6,237
Feb.	2,977	2,720	6,704
Mar.	3,046	2,842	6,414
Apr.	3,140	2,949	7,137
May	3,021	2,801	7,293
June	2,949	2,765	7,850
July	2,810	2,666	7,937
Aug.	3,059	2,860	8,201
Sept.	3,079	2,863	8,193
Oct.	3,442	3,187	7,893
Nov.	2,892	2,715	7,984
Dec.	2,794	2,612	7,616
Total	36,168	33,580	.....

PRODUCTION WORKERS

Estimated Number

	Nov. 1956	Oct. 1956	Nov. 1955
Ferrous	205,500	205,700	213,600
Nonferrous	67,000	66,600	67,600

Average Weekly Earnings

Gray Iron	85.41	84.84	87.96
Malleable Iron	85.84	85.67	85.90
Steel	95.08	96.87	93.52
Nonferrous	90.76	91.69	88.60

Average Weekly Hours

Gray Iron	40.1	40.4	42.7
Malleable Iron	40.3	40.6	41.9
Steel	41.7	42.3	42.9
Nonferrous	40.7	41.3	41.4

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS

(Net Tons[1])

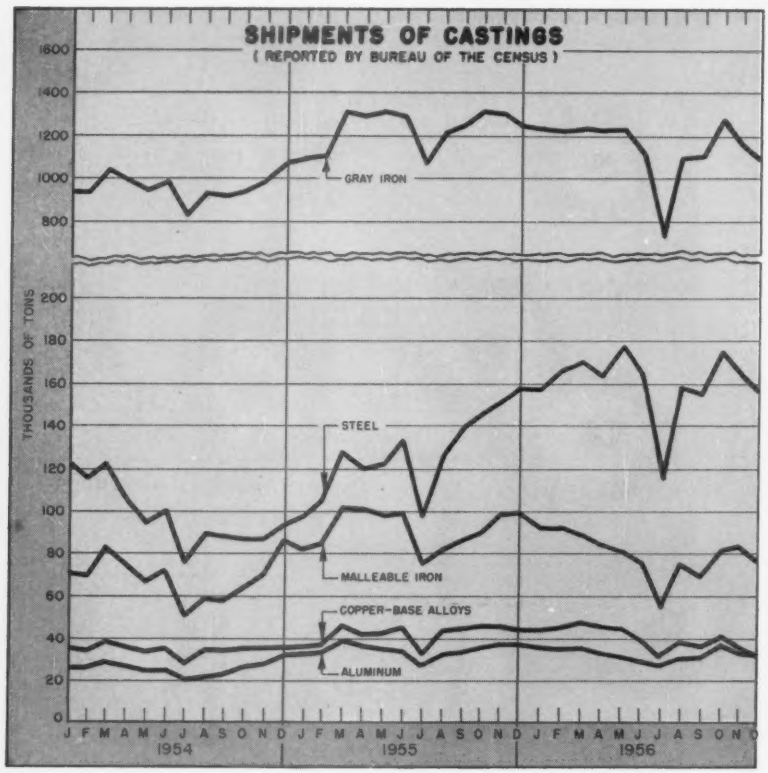
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1954	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,711	.....
1955										
Dec.	1,259,740	633,993	786,480	328,445	262,056	133,115	30,833	133,935	46,436	1,075,477
Total	14,837,745	7,987,205	9,161,685	3,715,963	2,739,864	1,392,209	385,041	1,681,630	869,558	.....
1956										
Jan.	1,249,518	677,017	769,826	326,269	257,150	132,581	32,408	131,346	58,788	1,157,818
Feb.	1,214,769	680,494	739,786	322,956	242,207	128,643	35,074	133,254	64,448	1,140,765
Mar.	1,255,405	715,173	752,498	331,749	254,045	139,624	42,676	132,384	73,802	1,162,578
Apr.	1,218,000	702,145	719,109	314,968	237,486	130,473	39,325	151,670	70,410	1,144,870
May	1,235,631	737,081	702,834	321,413	243,719	131,294	38,419	171,859	78,800	1,086,122
June	1,152,156	686,896	656,778	298,578	217,135	102,405	34,028	170,122	74,093	1,041,315
July	762,611	487,736	509,702	241,771	9,556	7,003	32,484	144,964	65,905	1,109,069
Aug.	1,103,195	671,523	639,953	293,673	170,857	89,589	31,712	180,249	80,424	1,074,461
Sept.	1,109,943	648,784	623,743	282,824	233,823	117,708	35,361	151,081	65,935	1,037,283
Oct.	1,274,734	734,384	749,200	331,069	252,203	134,265	30,978	171,377	70,976	996,351
Nov.	1,175,572	634,856	720,263	303,938	251,262	131,321	27,852	116,157	60,038	916,723
Dec.	1,108,993	587,046	681,834	281,527	254,703	136,584	25,874	92,439	54,143	920,034
Total	13,860,527	7,963,135	8,265,526	3,650,735	2,624,146	1,381,490	406,191	1,746,902	817,762	.....

STEEL CASTINGS—SHIPMENTS

(Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1954	1,184,096	880,158	135,581	802,321	580,474	120,309	381,285	303,428	15,315	.....
1955										
Dec.	158,982	122,201	29,003	116,872	88,894	26,919	42,110	33,307	2,084	475,335
Total	1,530,694	1,166,706	236,880	1,088,489	814,258	219,602	445,769	354,452	17,278	.....
1956										
Jan.	158,618	123,343	27,954	116,092	88,480	26,362	42,526	34,863	1,592	519,401
Feb.	165,398	128,598	30,833	123,279	94,998	29,112	42,119	33,600	1,721	567,330
Mar.	170,045	130,839	31,991	126,583	95,779	29,953	43,462	35,060	2,038	594,990
Apr.	163,708	125,015	27,475	121,723	91,332	25,302	41,985	33,683	2,173	600,242
May	178,227	142,025	35,949	134,919	107,575	33,695	43,308	34,450	2,254	608,275
June	164,661	129,147	31,296	122,483	95,621	28,801	42,178	33,526	2,495	597,103
July	117,984	96,350	19,833	88,971	72,837	18,545	29,013	23,513	1,288	611,233
Aug.	159,831	127,001	32,965	119,025	94,257	30,601	40,806	32,744	2,364	586,496
Sept.	155,046	121,705	33,496	116,905	91,266	31,314	38,141	30,439	2,182	562,937
Oct.	175,630	135,798	34,762	132,250	101,961	32,743	43,380	33,837	2,019	558,478
Nov.	164,114	126,900	28,284	122,212	93,262	26,436	41,902	33,638	1,848	545,862
Dec.	158,725	125,569	34,080	120,326	94,741	32,227	38,399	30,828	1,853	521,782
Total	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
(REPORTED BY BUREAU OF THE CENSUS)
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955
1956

COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1954	59,526,723	59,139,159	2,479,926
1955			
Dec.	6,865,032	6,949,073	284,936
Total	75,150,247	76,266,385	3,154,052
1956			
Jan.	6,914,836	6,182,704	275,660
Feb.	6,476,135	6,506,044	260,949
Mar.	6,896,593	6,861,698	267,414
Apr.	6,633,363	6,572,836	247,664
May	6,725,396	6,587,030	241,558
June	6,235,691	6,163,668	214,484
July	2,301,442	1,596,570	193,431
Aug.	5,614,997	5,281,627	225,978
Sept.	6,453,229	6,609,309	211,015
Oct.	6,742,483	6,951,386	253,147
Nov.	6,328,272	6,681,074	237,330
Dec.	6,615,935	6,959,900	224,452
Total	73,938,372	72,953,846	2,853,082

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1956	1957
Jan.	27,736	25,681
Feb.	24,949	.....
Mar.	28,310	.....
Apr.	25,808	.....
May	23,437	.....
June	18,842	.....
July	17,364	.....
Aug.	23,812	.....
Sept.	20,929	.....
Oct.	23,045	.....
Nov.	21,818	.....
Dec.	18,046	.....
Total for year	274,096	25,681

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1954	520,458	322,802	.....
1955			
Dec.	70,807	47,404	86,120
Total	778,000	493,244	.....
1956			
Jan.	68,050	43,750	83,234
Feb.	66,854	42,300	76,283
Mar.	65,760	42,806	73,025
Apr.	58,274	37,518	71,730
May	52,205	33,920	60,634
June	47,775	31,983	61,809
July	42,227	27,301	64,806
Aug.	52,321	33,281	73,411
Sept.	46,340	33,967	79,390
Oct.	65,450	41,943	75,706
Nov.	64,972	39,718	74,623
Dec.	58,111	36,090	75,293
Total	688,339	444,577	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1955	1956
Jan.	81.0	195.6
Feb.	90.4	169.0
Mar.	163.6	152.7
Apr.	178.6	135.2
May	145.7	207.0
June	186.8	156.7
July	213.4	110.3
Aug.	134.0	188.3
Sept.	156.7	114.7
Oct.	108.6	122.2
Nov.	154.4	121.0
Dec.	183.9	115.6

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average. This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace—Cupola Total	Air Total	Electric Total
1954	54,780,758	8,542,581	855,207	6,100,444
1955				
Nov.	6,441,351	952,906	112,056	839,971
11 mo.	66,158,129	9,876,282	1,158,034	7,927,189
Dec.	6,496,796	910,675	115,436	830,404
Total	72,654,925	10,786,957	1,273,470	8,757,593
1956				
Jan.	6,688,977	909,201	114,378	880,980
Feb.	6,345,421	892,373	116,418	833,661
Mar.	6,733,076	923,912	101,087	863,950
Apr.	6,490,680	862,233	96,514	842,216
May	6,491,567	855,007	104,485	899,967
June	5,994,989	776,299	87,525	831,456
July	1,986,613	621,064	56,071	399,441
Aug.	5,453,927	803,123	92,200	807,131
Sept.	6,231,017	738,824	84,627	841,783
Oct.	6,722,320	890,389	101,773	935,008
Nov.	6,305,947	822,542	95,890	875,524
11 mo.	65,444,534	9,094,967	1,050,968	9,011,117

PIG IRON PRODUCTION AND CONSUMPTION

	Production** (Standard grades—net tons) Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1955	77,114,073	2,858,957	3,884,971	62,570,394	7,799,751	68,944,698	5,326,534	260,008	246,406
1956									
Jan.	6,985,945	210,755	317,276	5,806,140	651,774	6,275,224	441,634	24,062	11,766
Feb.	6,539,199	229,440	370,208	5,350,650	588,901	5,871,824	430,792	24,307	13,010
Mar.	7,083,877	196,533	352,856	5,843,852	690,636	6,316,836	427,177	23,737	18,725
Apr.	6,860,833	210,319	333,660	5,623,647	693,207	6,077,074	413,537	22,757	17,179
May	6,873,102	232,375	329,750	5,625,067	685,910	6,064,632	413,494	24,074	28,596
June	6,387,608	213,769	331,871	5,227,488	614,480	5,642,004	379,803	22,039	23,460
July-Aug.	6,191,039	337,077	382,633	4,854,879	616,450	963,749	303,341	14,702	5,582
Sept.	6,873,352	236,809	316,590	5,636,288	683,665	4,618,718	404,948	22,719	17,604
Oct.	7,246,650	245,762	321,188	6,001,279	678,421	6,053,147	366,848	19,642	15,239
Nov.	6,977,457	140,277	354,573	5,831,885	664,051	6,450,404	446,449	22,548	19,064
Dec.	7,268,743	149,745	322,631	6,099,101	697,266	6,237,538	391,632	21,557	17,161
Total	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	.....	.....	.....	.....
1957									
Jan.	7,209,547	135,608	344,073	6,081,167	648,699	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

Now Hear This!

Photo from Cypress Gardens, Florida

Smith L-O Core Oil is First Choice in America's Foremost Foundries

When it comes to making accurate cores, the first consideration is an oil that is "ready to go" with the kind of sand and type of casting to be made. It is for this reason that many of America's foremost foundries order and re-order Smith L-O. These companies know there is a grade that blends perfectly with their conditions . . . many know — through happy experience — that a Smith Foundry Service Man was responsible for the selection of such a proper grade. If you need assistance, plus a core oil of guaranteed uniformity — look first to Smith L-O . . . the name that stands for a service as well as a product.

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SMITH OIL & REFINING CO.

INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

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- FOUNDRY SERVICE CO. Birmingham, Alabama
- F. F. SHORTSLEEVE Elmira, New York
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 7, Indiana
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
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Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Philadelphia . . . Boston

Philadelphia— Gray iron casting demand, easing steadily over recent weeks, now shows some signs of leveling off. Consumer inventories have been worked down to a point in a number of cases where ordering of castings can proceed on a more stable basis.

Some gray iron producers, in fact, would not be surprised to see an upturn in the trend before the end of April. They point out that there is considerable pattern shop activity, some units operating on a 48-hour-per-week schedule. For the present, however, melting operations still lag. Some jobbers are running no more than four days a week, and most of those on a five-day schedule, are doing so with limited working forces. Backlogs extend three to four weeks on heavy work, such as machine beds, die blocks and press parts, and not much more than a week on light work.

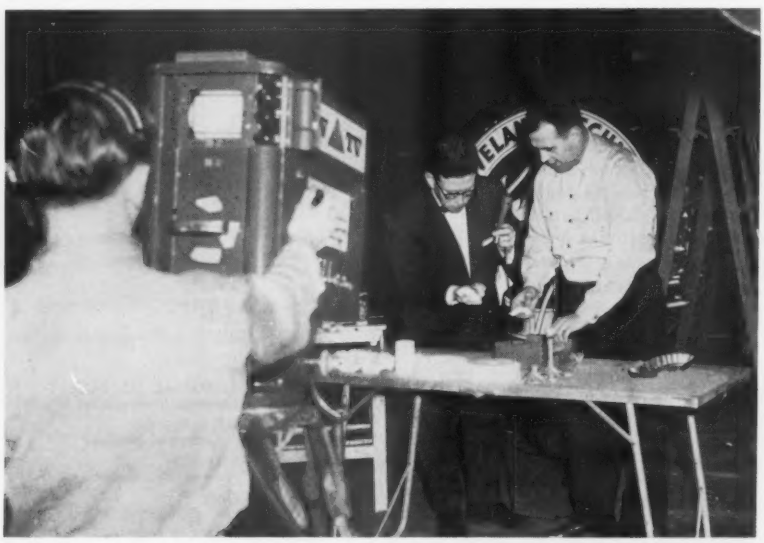
With few exceptions, soil pipe and pressure pipe foundries are not doing as well as they had anticipated at the beginning of the year. Housing starts are off, and in most cases the pipe shops generally have better than normal inventories, despite strikes at some soil pipe plants in the month just ended. Demand for castings for highway construction is fairly outstanding in an otherwise easy situation.

Malleable business is a little easier. This is true in pipe fittings and hardware, as well as in some of the minor lines. Operations are still fairly good, however, with backlogs averaging four or five weeks. Steel foundries are cutting in on backlogs, but promises run six to eight weeks and operations are being solidly maintained at five days a week and better.

Brass and bronze jobbers are finding the going rough. Demand for hardware and plumbing supplies is off and meter business is said to be the poorest in some time. Normally, with meter buying slow during the first quarter there is a fairly good activity in the building up of inventories. But this year so far there hasn't been even the usual amount of inventory building and this is reflected in both job and captive shops. Much of the present lag in brass and bronze castings is ascribed to the leaner outlook in housing construction.

Shipbuilding requirements, however, continue to grow, and there is a good business in industrial valves and pumps, even though inquiry is somewhat less brisk. The white metal shops are only moderately active.

Base prices on merchant iron were advanced $2 a ton on the major grades early in March and $5.75 on silvery iron. These higher prices have tended to bolster a somewhat soggy market in cast iron scrap.



TV PROGRAM: Northeastern Ohio Chapter of the American Foundrymen's Society sponsored a TV program Feb. 10 over Cleveland station KYW as part of a series of science programs appearing under the direction of the Cleveland Technical Societies Council. In this scene from the program are Dr. Carl Ludeke, left, University of Cincinnati, narrator, and William Walters, plaster department foreman, Aluminum Co. of America, assembling a plaster mold for an impeller

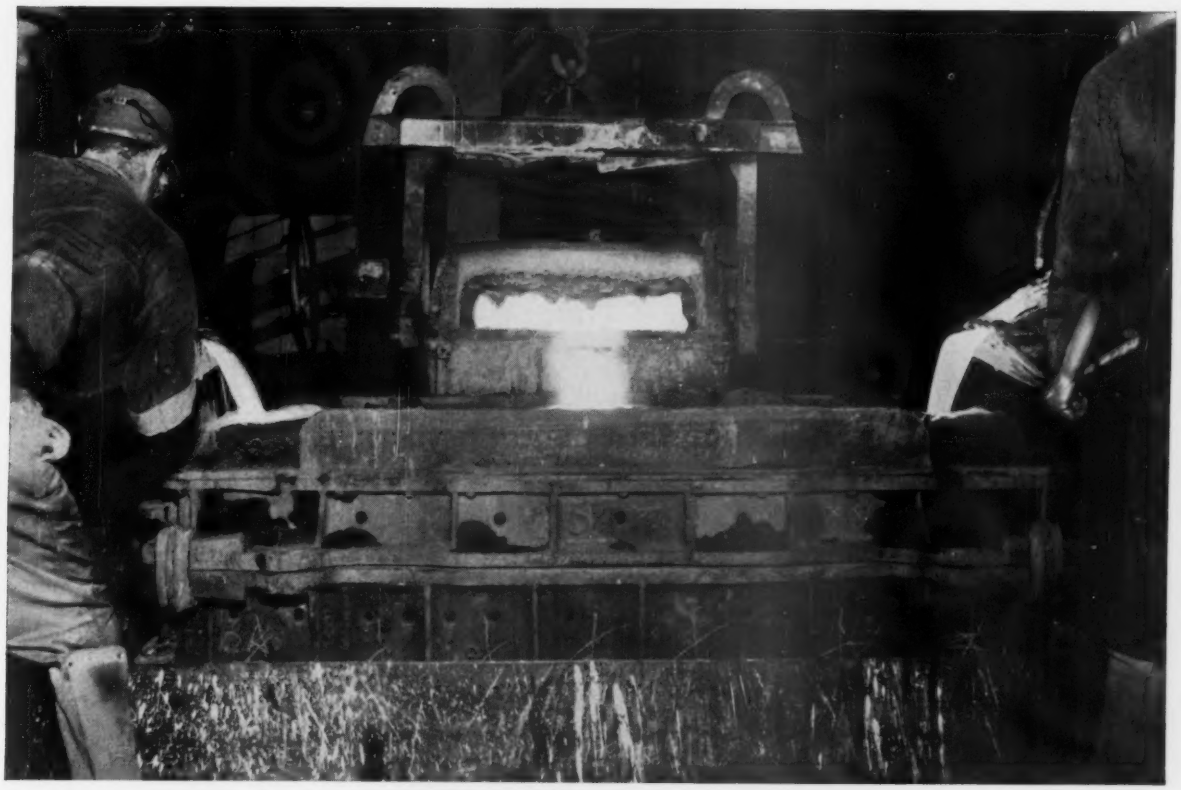
Boston— New England foundries holding Mystic furnace contracts for major tonnage requirements, approximately 250 shops, are confronted with higher pig iron costs, second quarter. Prices were established on February costs, substantially higher under new labor contract reached after the January suspension by strike.

Melt in the six northeastern states is likely to hold close to first quarter level; most shops are operating five days per week, some four, but melt is well under capacity. Producers of castings for paper mill equipment are well booked. Machine tool requirements are high, but slightly under those of last year.

Competition among jobbing shops tends to narrow profit margins; this situation is enhanced by activity of captive mechanized shops in booking outside tonnage for production runs.

Pittsburgh—Best castings consumption in this area is in production of ingot molds and industrial machinery. Steel foundries enjoy good demand for heavy machinery although orders declined slightly in January.

Mesta Machine Co. reports that its order backlog amounted to $79.3 million on Jan. 1, compared with $91.4 million one year earlier. Back-



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Experienced men on our foundry staff will gladly help you formulate a *winning combination* of binders. Ask your local sales office or write.

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For Outstanding Performance on:	Use This Combination of Binders:
Green bond	Mogul plus Dexocor
Dry bond	Dexocor plus Kordek
Green sand	Mogul plus Dextrine or Dexocor
Dry sand	Kordek plus Dexocor
Flowability	Dextrine or Kordek
Moisture resistance	Dexocor
Collapsibility	Dexocor plus Dextrine • Kordek or Mogul
Scratch hardness	Dexocor plus Dextrine or Kordek
Reduced baking time	Dexocor
Reduced gas	Dexocor
Better blowing	Dexocor plus Mogul
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Easy shake-out	Dexocor • Mogul • Kordek or Dextrine
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Smoother casting finish	Dexocor
Dry, easily handled	Dexocor • Mogul • Kordek or Dextrine
Less waste in handling	Dexocor • Mogul • Kordek or Dextrine
Better core paste	Kordek
Reduced costs	Dexocor plus Mogul

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This Simplified Design Will Cut YOUR PIG CASTING COSTS!

Bailey

PIG CASTING MACHINES

Drastically reduced maintenance costs result from the Bailey "stationary wheel" design, which eliminates 80% of the moving parts of ordinary pig casting machines. In this design roller bearing idler wheels are mounted on the frame rather than on the moulds, thus keeping them far as possible away from hot metal.

These machines are used in the casting of ferrous and non-ferrous pigs and ingots.

WILLIAM M. Bailey COMPANY
ENGINEERS
LEADERSHIP THROUGH QUALITY
1221 BANKSVILLE ROAD PITTSBURGH 16, PA.

log has grown since January, and the company looks for capacity operations through this year.

Foundrymen are again hit by rising costs, with a $2 increase in pig iron prices applied early in March. In addition, some labor contracts call for automatic increases as a result of higher living costs.

Gray iron foundrymen say late first quarter sales were fair, following a disappointing beginning of the year. Automotive and farm equipment casting users continue to cut inventories in view of availability of prompt casting delivery.

Chicago—Armour Research Foundation of Illinois Institute of Technology points in its recently issued 1956 annual report to its 20 years of service to industry and government through research. From a standing start in depression year 1936, with three on the staff, the organization finished 1956 with 1200 full-time staff members and was conducting research at an annual rate of nearly $12 million.

During its two decades of service, the Foundation has conducted more than 3000 research projects. During the 1955-56 fiscal year, projects numbered a record 691. Of these, 393 were for industry and 298 were for the government. In addition, internally sponsored investigations were expanded last year to 56, of which 29 were of fundamental nature and 27 applied research.

Research programs encompass ceramics and minerals; chemical, electrical and mechanical engineering; engineering economics; metals; physics; and propulsion and fluid mechanics. For the foundryman, activities of the metals research department offer the greatest interest, but the work of other departments frequently has a relationship to foundry practice.

Among foundry projects last year,

Our 50th year producing high quality alloys

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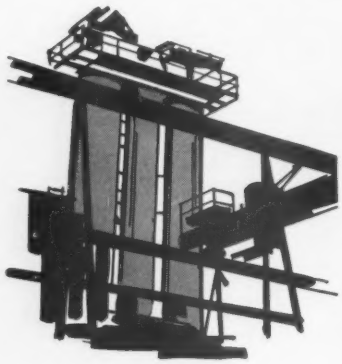
TERRE HAUTE SPECIAL FOUNDRY COKE

is the way foundries buy it...



• They buy it for top ratings in chemical and physical qualities—for clean sizing—for uniformity that occurs alone from exceeding care.

Only premium grades of West Virginia coking coals go into it—the best the market affords.

RESULT? You choose wisely and permanently when you specify Terre Haute Special Foundry Coke.

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Circle 701 on Inquiry Card—Page 51

★ ★ ★ This is where PATTERNS of quality and precision are produced for the automotive, aircraft and metalworking fields . . . backed by 35 years of know-how.

★ ★ ★ These superior PATTERNS are produced under the personal supervision of the two owners and a highly skilled group of employees.

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AUTOMOTIVE PATTERN company

Wood and Metal Patterns

18840 John R. St., Detroit, Michigan

several deserve mention. One is the development of an oil-bonded molding and core sand, commercial use of which is said to have confirmed such anticipated advantages as durability in service, ease of molding, and superior finish on castings. Substantially complete absence of moisture is appealing.

Another is the comprehensive study of effects of low-temperature forge pressing on properties of aluminum and magnesium castings. Current data indicate a definite relationship between improved ultimate tensile and yield strength with the amount of deformation performed. The achievement of this method, it is pointed out, would make available better engineering properties in aluminum castings for aircraft design.

A diesel engine builder is seeking new techniques in piston casting practice; improvements in the thermal life of metals; a study of the effects of thermal and mechanical stresses and design as related to material life; and heat transfer determination with changing power levels.

Information on merits of chill materials for gray iron castings to control solidification is incomplete and their ranking is not amenable to simple computation. In many cases it is desired to modify the solidification rate without developing a chill surface. Sponsored by one company is a program to evaluate various grades and thicknesses of carbon and graphite to compare with other materials.

The foundation also is maintaining for the third year a foundrymen's training center at Kharagpur, India, which has made available intensive three-month training courses to more than 250 foundry owners and supervisory personnel. Several manuals on foundry practice have been made available to schools and colleges there.

Investment Casting Institute Elects Five New Members

Five new companies have been elected to membership in the Investment Casting Institute, Chicago. The institute now is composed of more than 50 producers of parts made by the investment casting process.

The new members and their official representatives to the institute include the following: L. Sonneborn Sons Inc., New York City, Henry Levkoff; Gray Syracuse Inc., Manlius, N. Y., R. E. Gray; Hitchiner Mfg. Co., Milford, N. H., J. H. Morison; F-R Machine Works, Woodside, N. Y., S. Brotman; and Electronicast, division of Nilsen Mfg. Co., Addison, Ill., P. O. Nilsen.

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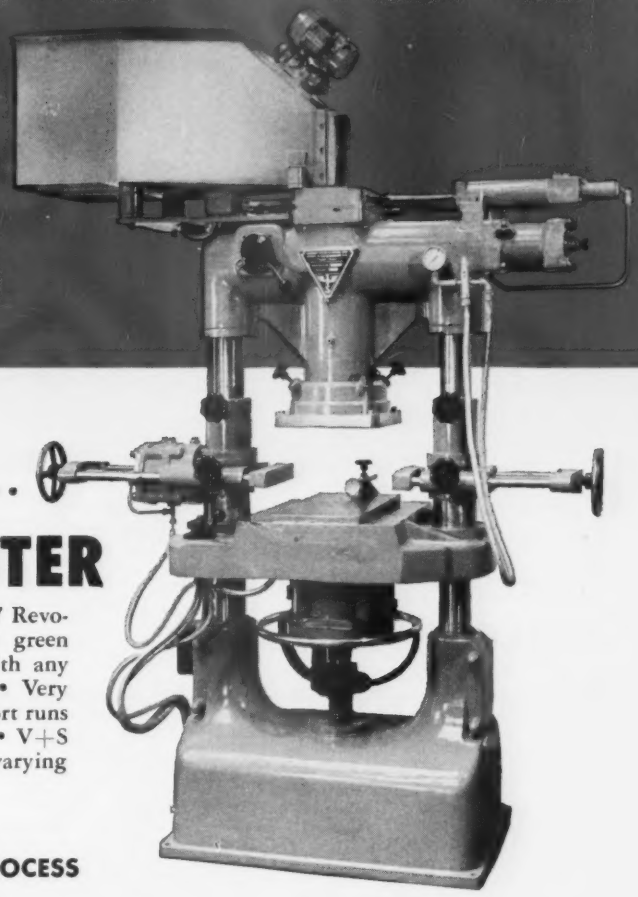

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. . . the world's fastest core making machine! Revolutionary new technique. Extremely high green strength "stand up" cores can be made with any binder • Negligible wear on wood boxes • Very little air is used • Economical for large or short runs • Core boxes can be changed in one minute • V+S Core Shooters are available in 4 sizes of varying capacities.

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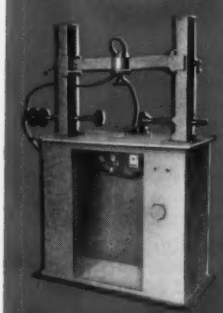
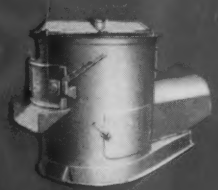


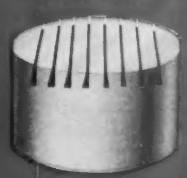
CARVER AUTOMATIC GASSING APPARATUS

FORMLAC CORE and MOLD WASH

puts a hard coat on CO_2 cores that tremendously improves handleability. High refractory properties assure against burn-in on any size casting. Wonderful to stiffen up long, delicate or thin cores.



V + S RAPID SAND MIXER



Self-Cleaning, Taper-Slot CORE VENTS

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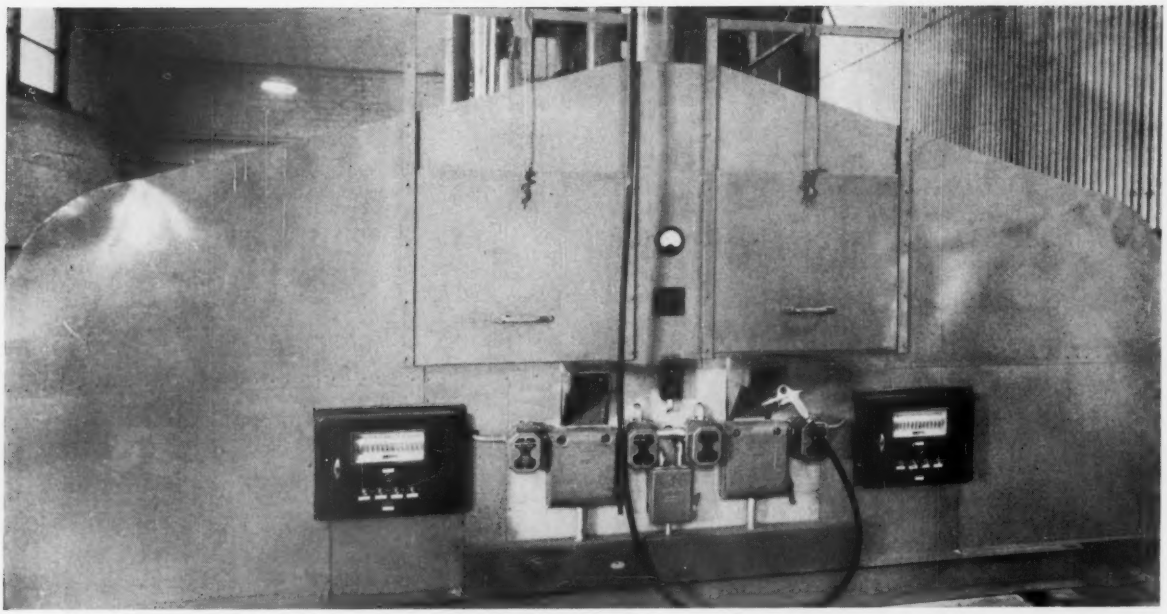
the original CO_2 sand binder, is the *standard of quality and comparison* throughout the world. Hardens fast, produces harder cores, less gas evolution and better shake-out. *Made in seven grades to meet our customers' specific requirements.*



View of double-station-corebox unit with both sliding doors closed shows the separate process timers for each station

Shell Cores Made by New Automatic Machine

By GEORGE B. SCHUELER
Director
Schueler Automatic Foundry Processes Ltd.
Derbyshire, England

INTRODUCED to the foundry industry in the wake of shell molding, hollow shell cores have been coming into increasingly greater use in both shell and green sand molding. Schueler Automatic Foundry Processes Ltd., an English company, has developed a fully automatic shell core machine based on the principle of injection molding of plastics or of hot-chamber die casting. A feature of the equipment is that a number of coreboxes can be operated at one time from the machine's single sand handling unit.

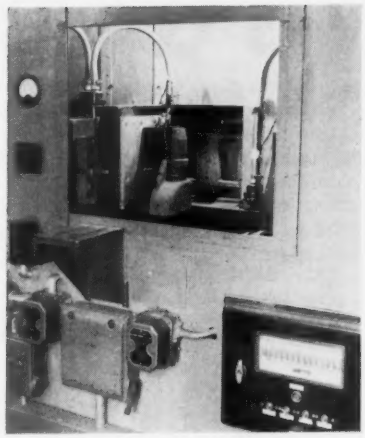
Work on the equipment began in 1949, and the first operating machine was installed late last year at John Maddox & Co., Oakenbridge, Salop, England, a malleable iron foundry. It is operating with two coremaking stations and has provisions for two more.

The automatic unit can shoot with equal facility a single core which requires up to 100 lb of sand, or it can produce a number of smaller cores. Shot injection is achieved by the sudden opening of a valve behind which the sand is situated under 80 to 100-psi air pressure.

Each complete shell core machine consists of at least two units. One of these is the shot molding unit. It includes a pressure canister which incorporates a coated-sand hopper complete with a small pneumatic elevator to maintain a supply of coated sand in the hopper. The same hopper also returns excess sand evacuated from the shell cores. The second unit is the corebox assembly, which is connected to the pressurized canister by a flexible rubber hose.

A shooting valve operated by a pneumatic cylinder is fixed to the outlet of the canister. Coated sand from the high-level hopper is fed to the canister through an automatic feed valve which maintains the sand level in the canister. Compressed air is supplied to the top of the canister through a pneumatic valve. A pneumatic elevator conveys the coated sand to the top hopper from a second hopper at floor level.

The corebox assembly, the second unit of the machine, is a means of handling hot coreboxes automatically. One half of a corebox is fitted rigidly to the framework, and the other is fitted to the ram head of a pneumatic cylinder unit.



Corebox at one station is shown open at end of automatic cycle

The coreboxes are heated by thermostatically controlled electrical platens, and the temperature of each half of the corebox can be read on a temperature indicator. A flexible, nonkink hose connects the shooting valve to the pressurizing head in the corebox unit. This component consists of a self-aligning, hinged plate operated by a pneumatic cylinder through a suitable leverage system. Three dial type timers control these factors: 1. The period during which the sand is held in the corebox under pressure. 2. Investment time

They're both right!

Man on the left claims that Tru-Steel does the best cleaning job at lowest cost. Fellow on the right swears by Malleabrasive. But they're *both* right! Tru-Steel is best on some jobs . . . Malleabrasive is best on others. Different jobs may call for different abrasives but the result should always be the same—the best job at lowest cost per ton of castings cleaned. Whichever you need, Pangborn has the right abrasive for your job. Our sales engineers are experts on abrasives. Ask the one in your area for his advice or write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

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Choose any style chill nail from jumbo to stubby; slim, medium, or horse nail blade; blunt, pointed, straight or 90° bent. Same types available in Stainless, Brass, Aluminum; Copper coated to order. Spider Chills, jumbo or horse nail legs—double or single. Available in various sizes and types; also made to your individual specifications.

Write for detailed descriptions and prices.

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SPECIAL PARTS

Circle 705 on Inquiry Card—Page 51

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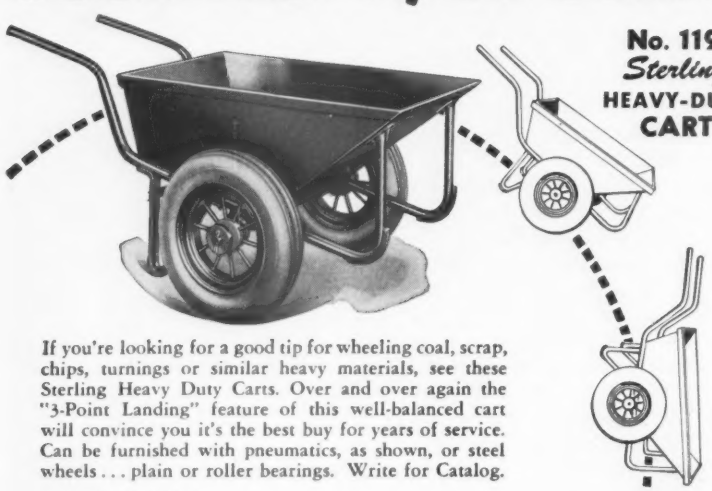

No. 119 Sterling HEAVY-DUTY CART

If you're looking for a good tip for wheeling coal, scrap, chips, turnings or similar heavy materials, see these Sterling Heavy Duty Carts. Over and over again the "3-Point Landing" feature of this well-balanced cart will convince you it's the best buy for years of service. Can be furnished with pneumatics, as shown, or steel wheels . . . plain or roller bearings. Write for Catalog.

3 SIZES AVAILABLE:

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A HALF CENTURY OF PROGRESS

Sterling WHEELBARROWS

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Circle 706 on Inquiry Card—Page 51

(which determines the thickness of the shell). 3. Curing time.

The corebox unit is completely enclosed and fitted with sliding doors. It can accommodate boxes up to 12 x 12 x 12 in.

Sand precoated with resin is shot by the valve, which admits it under pressure and projects it into the cavity of the box. After the elapse of the investment time, the bottom of the corebox is opened and the unused sand falls onto a wire-mesh grid below and is drawn into a duct by a current of air. The cold air taking the sand through the grid cools it and tends to break up any agglomerates into fine particles. Any particles which will not break up remain on the grid. The duct takes the sand up to the main storage hopper of the machine, 12 to 15 ft above floor level.

It is joined there by coated sand coming from the primary feed hopper (½-ton capacity). This sand also is lifted by air blast. The flow is adjusted to compensate for the sand used in production. From the main hopper, sand is fed at approximate stages during the cycle of operation to maintain a predetermined level in the pressure canister.

Pushbutton Starts Operations

A single pushbutton starts the series of operations at predetermined time intervals controlled by the process timer. Controls are provided to permit either manual or automatic operation.

After the corebox has opened automatically, the operator takes over. He removes the core from the fixed platen, cleans the corebox with air, occasionally sprays the corebox face with a stripping agent and presses the button to start the cycle again.

Only metal coreboxes can be used. Standard metal coreboxes can be employed, provided they are solid metal and have a flat back to insure maximum heat transfer from the heater platens. Any metal corebox can be adapted easily to this type of equipment. Quick changeovers of coreboxes can be effected with two sets of heater plates so that replacement coreboxes can be heated on the bench before use.

The shell cores produced are consistent in weight and finish. No skilled labor is required, and heavy coreboxes can be used since there is no handling of hot boxes. When small cores are in production, a number of coreboxes may be fitted for blowing simultaneously, thus making the process more economical. Because it is totally enclosed, the machine produces a minimum of dust and fumes.

The cores have good, uniform

Silvery Pig Iron

Originated 84 years ago, Globe Silvery Pig Iron has remained in a class by itself. It provides accurate silicon control with all grades ranging from 6 to 16% silicon.

A skilled metallurgical staff is available to help you select the correct grade for your specific requirements.

- **Made from all-virgin ore.**
- **Uniform structure — uniform melting and even silicon distribution.**
- **Readily identified and easily handled by magnet or hand.**

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IRON ORE • PIG IRON
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strength. Although highly permeable, they are not at all friable on the surface. Since the process is automatic after best operating conditions have been determined and the appropriate process timer settings have been marked on the corebox, it is possible to go into production with any core at a few minutes' notice. Cores of various weights, for use with different metals, can be produced by altering the settings of the process timer.

At a demonstration the weight of a core was reduced 30 per cent by a reduction of only a few seconds in the investment time. This ability also shows the desirability of automatic control to achieve uniformity of product.

The whole machine is operated pneumatically with electrical controls using about 20 cfm of compressed air at 80 to 100 psi and with a three-phase, four-wire electrical supply of 15 amp at 400/450 volts.

Schedules 1957 Conference on Material Handling Training

The fourth annual Material Handling Training Conference is scheduled this year from June 16-29 at the Industrial Management Center, Lake Placid, N. Y. It will emphasize cost reduction opportunities possible through material handling improvement, elimination of handling bottlenecks and better use of storage space.

To keep the course on a practical level, it will be limited to men in industry with a minimum of three years of experience, and two classes of not more than 28 men each will be formed. The staff will consist of 20 material handling experts from industry and government. An illustrated brochure which describes the course in detail is available from the Industrial Management Center, 56 Robbins Rd., Lexington 73, Mass.

Book Review

1956 *Supplement to Book of Standards, Part 2, Non-Ferrous Metals*, paper, 333 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

This volume contains 53 standards and tentatives revised and adopted since publication of the *Book of Standards* in 1955. Of the 17 standards published, 14 are replacements of existing standards, 2 represent tentatives revised and adopted, and 1 is published for the first time. Of 36 tentatives, 27 are replacements of existing tentatives, and 9 are published for the first time.

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Thoroughly modern, the plant at Beverly, Ohio, is ideally situated to distribute its diversified ferroalloy products by rail, water, and truck.

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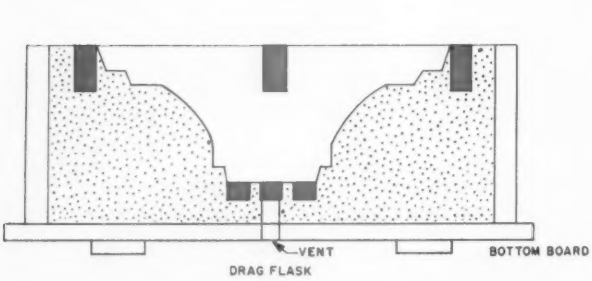
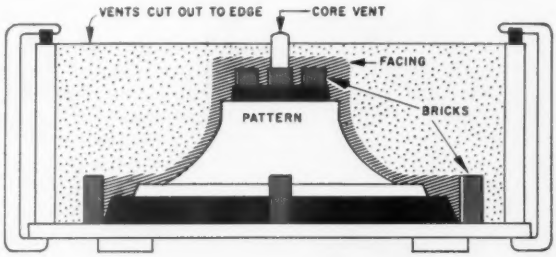
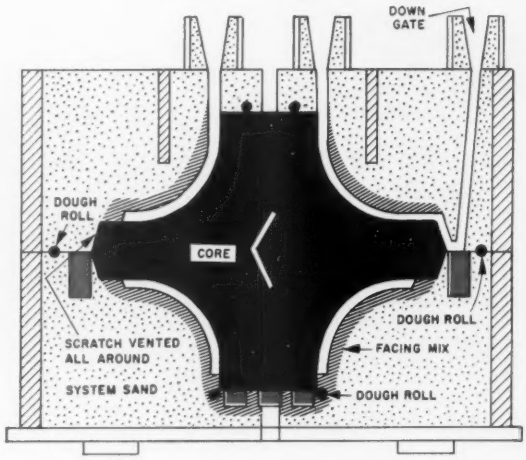
Trouble Shooting

By C. W. AMMEN







Drawings show molding steps for large brass impeller. Above, drag flask. Right, finished drag flask, rolled over. Lower right, completed mold and risers

Heavy Brass Castings

Dear Charlie:

I'm searching for some information in regard to making heavy brass castings in green sand—especially very large pump impellers, wear rings and pump cases. Those in the range from 300 to 1800 lb are the ones we really have our trouble with.

Sincerely,
Sam

Dear Sam:

Sure got a large charge out of your letter. It is all-embracing. I once had a bird ask over a cup of coffee what is the largest single factor causing scrap in the foundry. Oh, brother! Remember, when you have an elephant to eat, you must cut him into little pieces first.

Most scrap, large or small, is caused by the little things. About 90 per cent of the time, the source is slipshod practice of basic fundamentals.

You can keep down scrap by spending 90 per cent of your time sticking your nose into molds and legging it about the shop and 10 per cent of your time in the office. Basically, making big brass castings is little different from making small ones. When it comes to a big fellow, however, most foundrymen, unless they make mostly large castings, suffer from an ancient disease known by one and all as cold feet. For the most part, of course, big castings are in the minority in brass jobbing shops.

Each operation in making a large casting is of utmost importance. You should take as much care with the selection of the bottom board as with the metal composition. Everything should be right—bottom board, mold board, clamps, flask, sand, etc. Take your time and do the job properly. Keep in mind that casting design sometimes is conducive to defects of various kinds.

Sand preparation deserves special attention. Floor sand usually is suitable for run-of-the-mill work, but not for large or heavy-sectioned castings. I believe that many brass foundrymen do not pay enough attention to the amount of combustibles in their system sand. Wood flour or a prepared additive of a cellulose nature should be added to cushion the sand and provide something to burn, allowing for sand expansion.

Let's say that we're making a large impeller in a shop which uses a fine, rather low-permeability sand in its system. Iron or steel flasks should be used if possible, but wooden flasks can be used if they are reinforced properly.

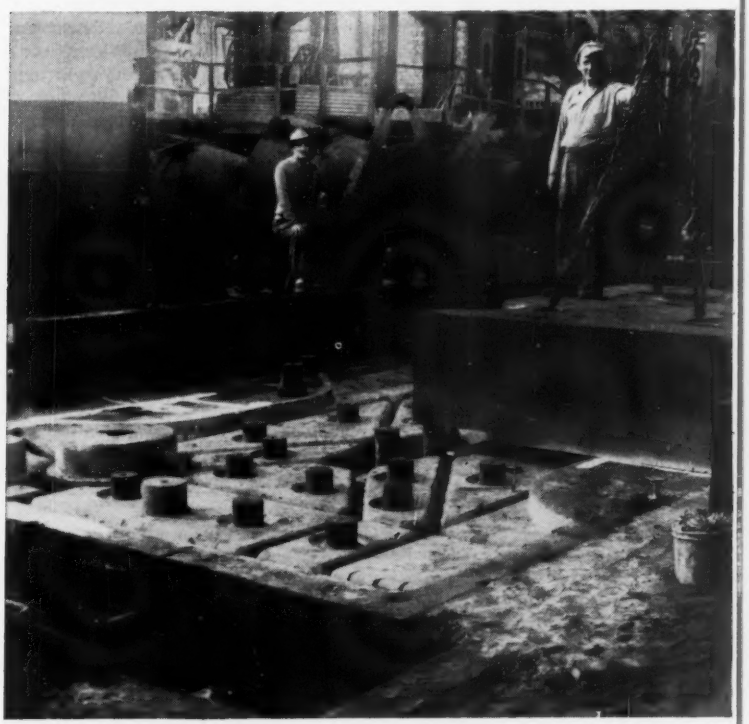
Place the drag half of the pattern on a well built, clean, level molding board, and place the drag flask over the pattern. With a jack or suitable clamps, clamp this assembly together to prevent any movement or shifting during ramming. Apply a little parting to the pattern.

Next, place several fire bricks in a circle on the hub print and space four bricks equally, set on end, with the 2-in. face against the outside core print as shown in the accompanying drawings. The bricks on the hub will serve as a solid footing for the core, and those on the outside will act as a bearing when the core is set. Spread out a wheelbarrowful of system sand and add three or four shovelfuls of beach sand and one shovelful each of wood flour, fire clay and wheat flour. Cut the mix well, temper, and then riddle it at least twice.

System sand may be placed loosely around next to the flask, but away from the pattern, to conserve the

KOLD-SET®

COLD SETTING BINDER
APPLICATION REPORT



Core making time was reduced 16 to 20 hours on this core with Kold-Set bonded sand. The mold pit shown contains 35 individual cores. Four cover cores, 10 tons each, make up the cope. Casting weight 160,000 lbs.

Problem:

A large order was taken for platen castings with a definite delivery schedule to meet. Previous experiences in making this casting would prohibit maintaining this particular delivery promise. Excessive time in core making, core setting and shakeout were the problems that had to be overcome.

Solution:

KOLD-SET was used exclusively in the making of this casting. KOLD-SET slab cores were used in the bottom of the pit and four (4) KOLD-SET cover cores were used as cope to replace the conventional dry sand cope.

Advantages:

Core making time was reduced 16 to 20 hours; oven drying reduced 30%; Core setting, because of the accurate core dimensions, was reduced in excess of 50% (KOLD-SET cores fit almost perfectly). At shakeout all cores fall free of the casting. Rough cleaning was eliminated; finish cleaning time was reduced to a minimum.

KOLD-SET

COLD SETTING BINDER
ADVANTAGES

Laboratory Control

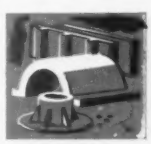
Only finest ingredients, in full measure are used to make Kold-Set Binder and Activator. Completely uniform manufacture, governed by scientifically controlled laboratory procedure makes Kold-Set consistent in quality . . . the unrivaled best cold-setting binder.

Engineering "Know-how"

G. E. Smith engineers have the broad background of foundry experience necessary to apply Kold-Set to core and mold making problems intelligently. They are backed up with a thoroughly qualified, service-minded engineering and research organization.

On the job Assistance

G. E. Smith service includes "in-plant" assistance in setting up the best method for making cores and molds with the equipment available. Engineers are qualified and equipped to recommend methods to achieve optimum results with Kold-Set at a minimum of expense.



Proved Performance

The Kold-Set process not only greatly speeds core and mold making. It has been proved in plant after plant to produce uniform, more accurate cores and molds with excellent surface and dimensional stability. It produces better castings at lower overall cost.

FOR FULL TECHNICAL DATA . . .

Write for Technical Bulletins 2 and 3 for the complete story on the Kold-Set process and how it can drastically reduce mold, core and shakeout costs.

G. E. SMITH, INC.

246 WASHINGTON ROAD — PITTSBURGH 16, PA.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES.

amount of facing required to do the job. Riddle the facing over the pattern to a depth of about ½-in., tucking with your hands around the bricks and pattern. Cover the entire job with system sand which has been riddled or aerated, walk off the sand, and peen the entire surface. It is best to peen your way up by going 3 or 4 in. at a time to insure even ramming.

When you finish the drag, butt off the top, strike off, and vent with ⅛ or ¼-in. vent wire to within ½ in. of the pattern. Cut a 1-in. vent through the drag to vent the core. If the bottom board has no central opening for venting, bring vents out to the edge of the flask from the vent hole.

Remove clamps, rub on a good, stout bottom board, clamp the entire assembly, and roll it over. Place the drag where it will remain for pouring and level firmly with sand or wedges. Release clamps, remove molding board, and trowel the entire sand face smooth and firm. Any soft spots can be dug out and made firm with facing and a hand rammer.

Place the cope half of the pattern in position on the drag pattern. Next, set the cope flask on the drag and check fit and pins for a good, flush joint. Lay out, cut and fit any necessary cope bars, bringing them to within ½ in. of the pattern, in conformance to the pattern contour. Place location marks on cope and drag to prevent a reversal when returning it to ram or close up. Tuck the bars in lightly, remove the cope and roll it over, top side down, on the floor. Reinforce the bars, etc.

Dust the drag with dry parting and parting sand, and riddle facing over the entire drag surface of the drag parting. A depth of ⅛ to ¼ in. is satisfactory. Remove this sand from around the flask joint with a trowel or brush to prevent dripping

of clay wash or water onto the actual parting. Wash the cope flask inside surfaces and the bars with clay wash. Riddle facing and throw it over the washed surfaces to coat them with sand.

Place the cope flask in position on the drag flask and pattern. Clamp cope, drag and bottom board together to prevent movement. The cope is rammed the same way as the drag with the exception of setting risers, sprue pin, necessary soldiers, gaggers, etc. Ram a little at a time, tucking carefully under the bars, When the cope is completely rammed, risers, sprue pin, etc., are removed, and the cope is struck off level.

If the cope pattern for any reason will not come up with the cope, a long draw spike is driven down through the cope into the pattern and secured in such a manner as to carry the cope pattern with the cope when the cope is lifted from the drag.

In occasional extreme cases the cope pattern is tied through prior to ramming and is cut loose afterward. Clamps are removed, and the cope is drawn off and set up on edge on horses. If a draw spike or ties are used, they are released or removed. The molding board is rubbed in place and clamped to the cope top. The assembly is rolled over on its back on horses.

Next, the cope pattern is swabbed

ARC-SPOT miller GENERATORS WELDERS

. . . WORLD'S LONGEST LINE OF WELDERS

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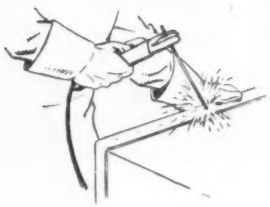

A-C Transformer Type
in 16 models from 20 to 800 amperes

A-C Submerged Arc Type
3 models, 150 to 1875 amperes

D-C Selenium Rectifier Type
12 models, 3 to 1500 amperes

D-C Selenium Rectifier Constant Potential Type
3 models, 300 to 1000 amperes

A-C/D-C Combinations for Metallic Arc Welding
6 models, 10 to 525 amperes

Spotwelders
14 models, 1.5 to 20 KVA

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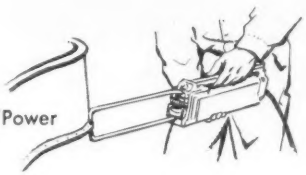

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and drawn and the mold face tooled. In this position, the cope is finished. The mold may be poured either green or wet blacked and skin dried. If you don't have sufficient experience in skin drying, stick to green sand molding.

If you intend to spray or swab with blacking or to rub dry blacking onto the mold cavity, finish it with the cope in this position. If wet blacking is used, skin dry, remove clamps, roll the cope over and finish the top side. General practice is to finish the cope and place it in a bail or on horses in the position for closing. Do this before the drag pattern is removed. Should you lose the cope along the line, it can be rerammed since the pattern still is in position in the drag.

Swab the drag pattern, remove it, and tool the mold face. Cut vents to the outer edge of the flask around the core print, taking care not to cross any gates, etc. The drag may be dry or wet blacked as was the cope (if wet blacked, it is dried with a torch or coke basket). A dough roll or core paste is put in a circle around the drag print vent to seal it off from any metal, and the core is set and carefully checked for fit, level and height. A dough roll or paste then is run around the top core print and flask joint. The cope is placed in position and clamped, pouring and riser cups are placed, and you are ready to pour.

Sincerely,
Charlie

Buffalo Group Elects Officers

At a regular meeting of the Buffalo management executives group of the Gray Iron Founders' Society, the following new officers were elected: John J. Bingenheimer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y., chairman; Eugene F. Smith, A. L. Swett Iron Works, Medina, N. Y., vice chairman; and Robert F. Pohlman, Pohlman Foundry Co., Buffalo, secretary-treasurer.

Booklet Stresses Key Role Of Skilled Craftsmen

The key role of the skilled craftsman as the "anchor man" on industry's technological team is stressed in a new educational aid booklet just published by the education department of the National Association of Manufacturers.

Entitled *Your Opportunities in Industry as a Skilled Craftsman,* the 32-page booklet covers the scope, content and importance of apprentice training.

It enumerates the immediate values of vocational-industrial and industrial arts training in helping a youngster to get a head start on skill development.

Profusely illustrated, the booklet describes six vital craft specialties in detail. These include patternmaker, millwright, toolmaker or diemaker, maintenance electrician, all-round machinist and draftsman. It indicates how the student best can prepare himself while in high school and points out the courses and special aptitudes required for skill development.

This booklet is the first of two to be published for junior and senior high school students, guidance counselors and libraries. The second, to be off the press soon, is entitled *Your Opportunities in Industry as a Technician.* Both can be obtained from the education department, National Association of Manufacturers, 2 East 48th St., New York 17, New York.

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Postwar Developments in

Britain's Foundry Industry

By D. H. HOUSEMAN
Sheffield University
Sheffield, England

Aluminum permanent mold casting being poured at Northern Aluminum Co., Banbury, England

THIS article gives a brief indication of the size and scope of the United Kingdom castings industry, and describes some of the important developments that have taken place within the industry since 1945.

The latest (1956) figures indicate that fewer than 2000 iron foundries are in operation in the United Kingdom, providing annually about 4,000,000 tons of gray and malleable iron castings with a labor force of about 140,000. Most of these iron foundries are small, only about 5 per cent employing over 300 workers while two-thirds employ less than 50.

Steel foundries form a relatively compact section of the foundry industry, numbering (1956) 103 foundries employing 18,000 to 20,000 persons and producing yearly about 300,000 tons of steel castings valued at $117,600,000. The average foundry produces 70 to 80 tons of finished castings per week, and the largest about 500 tons per week; total output has doubled (on a tonnage basis) over the last ten years.

Bronze and brass foundries probably number at least 3000, the majority being very small concerns; it is difficult on this account to estimate current output and employment. *Ryland's Directory* (1956) lists some 450 light alloy foundries of all types in the United Kingdom, the rough annual output of which is estimated to be: Sand castings 20,000 to 25,000 tons, gravity die (permanent mold) castings 40,000 tons, and pressure die castings 12,000 tons.

Melting and Casting—Though the bulk of iron foundry melting takes place in cupolas—and this is likely to be true for many years to come—substantial progress has been made in the development of rotary and electric furnaces for making special qualities of iron or where small batches are needed. The cupola process itself also has been greatly improved by the use of preheated blast, water cooling of the melting zone and improvements in refractory linings.

For the smaller foundry, or that requiring batch melting of iron, the

Three ladles simultaneously pour 48 tons of molten iron for a hammer block for a forging hammer at Davy & United Engineering Co., Sheffield, England. The finished, machined weight of the block is 45 tons

CO_2 hardened cores and molds get extra refractory protection with

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To meet the growing demands of foundries which need a good mold and core wash well suited to the carbon dioxide mold-core hardening process—The United States Graphite Company has pioneered and developed MEXICAN® VV Flake ("volatile vehicle"). This new mold and core wash comes in paste form and is completely compatible with isopropyl alcohol, oleum spirits, kerosene, or similar agents. Mixed with isopropyl alcohol as its thinner, it can be easily "lit off" to promote faster drying. Suitable for application by spraying or dipping, MEXICAN VV Flake provides excellent protection and peel for molds and cores . . . bringing to foundries which utilize the CO_2 technique, a new high in production and casting quality; and greater refractory protection for molds and cores. Use of MEXICAN VV Flake with isopropyl alcohol improves the skin hardness and allows molds and cores to be stored for longer periods of time without deteriorating. Comes in 55 gallon drums.

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rotary furnace, using pulverized fuel or oil firing, is probably the most serious competitor to the cupola. Despite the somewhat higher cost per ton of iron produced, more positive control of temperature and atmosphere made possible by oil firing, the greater range of raw materials that can be used and compositions that can be produced, make this unit increasingly interesting (for example, as a duplexing unit with the conventional cupola) as the costs of pig iron rise relative to those of iron and steel scrap.

In the steel foundry, the most significant postwar trend has been that of increasingly stringent specifications for steel castings that are becoming general in the engineering industry. This has led to numbers of steel foundries turning over from side-blown (Tropenas) converters for metal melting to either electric arc or high-frequency induction furnaces. During the last seven years, about 45 arc furnaces with an estimated total charged capacity of 200 tons have been installed in United Kingdom steel foundries.

Transformer Ratings Are Increased

The trend toward higher melting rates and lowered costs has been helped by substantially increased transformer ratings, which now average over 400 kva per ton. The use of oxygen lancing is now widely practiced in Britain's steel foundries; the increased temperatures, particularly during alloy steel production, throw considerable strain on the refractories used for roof and sidewalls. Wear of the former has been reduced by careful design of water-cooled roof rings and use of high-quality silica brick, while metal-cased magnesite tubes are giving excellent service in sidewalls.

Temperature control by the dipping rare-metal thermocouple is widely practiced, and attention has been paid to water cooling for door arches and jambs, fume extraction by means of hoods and ducts, and improvement of electrode consumption through the introduction of quality control tests.

Upwards of 70 high-frequency induction furnaces, mostly of ¼ to ½ ton capacity, have been installed, and much interest has been shown in the line frequency coreless induction furnace on account of its greatly improved power factor and decreased first cost. It seems likely that several of these furnaces will be installed in British steel foundries during 1957.

The refractories problems that have limited the wide-spread use of low-frequency induction furnaces of the Ajax-Wyatt type in copper-base foundry melting have now been largely overcome by the development of suitable siliceous and aluminosilicate linings which must, however, be properly rammed for long life and trouble-free operation. Likewise the development of a rammed monolithic siliceous lining using sodium silicate as a bond has greatly improved the performance of the twin-bath horizontal-channel low-frequency induction furnace in light alloy melting. The line frequency coreless furnace mentioned above is of much interest to the brass and bronze founder because it can be completely emptied after each heat and is thus well suited to batch production and jobbing foundries.

Molding and Coremaking — The large increase in the production of castings of all kinds since 1945 has led to two important molding changes in Britain. One is the increasing substitution of machine molding for hand molding over a wide range of castings; the other is the introduction of new molding techniques of which shell molding and the CO_2 process have been outstanding examples.

Except for some difficulties with plain carbon steels, almost all kinds of foundry alloys have been successfully cast into shell molds. In some cases, however, notably bronze and gray iron, the improvement in finish and dimensional accuracy is marginal and insufficient, except for extremely long production runs, to offset the increased cost of metal patterns and of the resin or other bond used. Shell cores are in process of rapid development, since their light weight makes them more economical than oil-sand cores in many applications.

Interest in the old-established use of sodium silicate as a bonding agent for foundry sands was revived soon after the end of World War II when shortage of core-drying equipment focused attention on methods of drying molds and cores on the foundry floor. The process consists in blowing carbon dioxide gas into prepared holes in a mold or core made from sand bonded with sodium silicate so as to decompose the binder and harden the mix, a process which takes only a few seconds.

Advantages of the process include increased accuracy, since hardening takes place in contact with the pattern, greater output per unit area of floor space and lower gas evolution during pouring. Drawbacks include increased difficulty in shakeout,

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- **CONTINUOUS POURING** — no waiting until floors, flasks, boards, etc., are filled with moulds.
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The Reda Furnace is a modern furnace design. It is sturdily constructed, without gadgets, for rugged operation. It is designed to give increased speed and efficiency in melting ferrous and non-ferrous metals. Use of Reda Furnaces has resulted in savings as high as 50% by foundries in various parts of the country.

FURNACE DIVISION WRITE TODAY FOR DESCRIPTIVE BULLETIN

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It is no accident that more and more foundries are turning to *Louthan Strainer Cores* as a means of upping production, cutting labor costs. They *try* them, find that they *do* improve operations—through cutting scrap losses in castings and reducing "rework" costs.

Louthan Refractory Cores keep slag and sand-core inclusions out of castings, and permit closer control of the molten metal. They withstand 3000°F. temperatures without spalling or disintegrating. You'll also find them exceptionally uniform, dimensionally accurate, easy to handle, simple and economical to use.

To help you make comparative tests in your plant, under normal production conditions, we now have *core prints* of our standard strainer cores which can be easily attached to your patterns. We'll be happy to *give* you these and a reasonable quantity of the matching strainer cores. Simply tell us your sprue diameter (or ingate size) and we'll send them to you. Your only obligation is to *try* them and judge the results for yourself!

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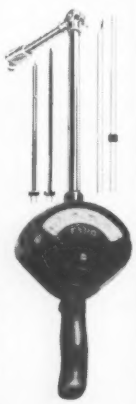

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the necessity for drying the sand, and lowering of sand refractoriness owing to accumulation of low-melting alkali silicates in the system sand. Unlike shell molding, the CO_2 process seems to offer great advantages to the jobbing founder since it is just as easily applied to one casting as to many; it has been increasingly adopted in United Kingdom foundries during the last two years.

On the foundry floor, increasing interest is being shown in improved methods of sand control and, following fundamental work by the research associations, in the properties of sands at high temperatures—notably hot strength, expansion defects, hot tearing, and the need for careful and adequate ramming to avoid metal penetration and sand burn-on in steel castings.

"Twenty five years in this business and you don't know a little thing like that?"
"What? Sure I know . . . let me think . . . hold it a minute."

Plant Engineering — In common with most other manufacturing industries, the trend towards automation in the foundry industry continues rapidly. A good recent example is the Farington iron and steel foundry of Leyland Motors Ltd. This foundry produces many hundreds of cylinder blocks weekly for several different manufacturers as well as for its own use. Automation starts with the jolt-squeeze production of molds, including automatic ejection from the pattern, and is followed by transfer to the core setting, closing, pouring and shakeout stations. Cleaning of castings can be carried out in an automatic airless shotblasting plant while sand reclamation is, of course, fully automatic.

Despite considerable improvements in the efficiency of shotblasting, grinding and chipping equipment, many foundries are still sorely troubled by cleaning room bottlenecks which to some extent offset increases in productivity at earlier stages. For this reason, much interest is currently being shown in the American idea of installing much heavier machine tools capable of handling rough castings straight from the foundry.

The elimination of dust produced as a result of the cleaning of castings is desirable on general health grounds, and much work has been directed to this end during the last ten years. Dust sampling methods have been improved and dust level surveys in specific foundry locations, such as cleaning shops and knockout stations, have been carried out. These have led to the introduction of grinding wheels and chipping hammers incorporating suction systems for the removal of freshly created dust.

Great improvements have also been made in reducing the general level of foundry dust by moistening sand heaps and floors, rapid removal of waste materials from the foundry and improved design of dust extraction, ventilation and space heating equipment.

Health Precautions — Associated with the control of dust is the problem of silicosis, which is especially important in steel foundries and which has been tackled very energetically by the British Steel Founders' Association during the last ten years. Three lines of attack have been pursued: Radiographic examination of personnel with a view to early diagnosis and treatment; the limitation of the exposure risk by design and production of an efficient respirator, and the support of long-term research, including some in a university, on the nature and causes of silicosis. Though the nature of the disease is not yet known, it is clear already that the combined effect of this triple attack is a marked reduction in this once serious occupational hazard.

A recently published survey shows a decrease in accidents for 1953 (the latest year for which figures are available) compared with previous years. As in industry generally, accidents due to handling of materials are by far the most frequent, while those due to molten metal and other corrosive substances are surprisingly low. Eye accidents have been decreasing for a number of years, presumably due to the increasing use of protective goggles. An important feature in this reduction of accidents is the appointment, by many large

and medium foundries, of a full-time safety officer, responsible, among other things, for the introduction and use of suitable protective clothing wherever hazardous operations are carried out.

Redefines Small Gray Iron And Nonferrous Foundries

Effective Jan. 1, 1957, federal government purchasing agencies changed their definition of small gray iron and nonferrous foundries. Formerly, any foundry, regardless of type, was classified as large if it had 500 or more employees.

That yardstick still applies to malleable iron and steel foundries, but for gray iron and nonferrous foundries, only those with 250 or fewer employees will be considered small. Where a foundry produces more than one type of casting, the standard to be used is that for the type of casting primarily produced.

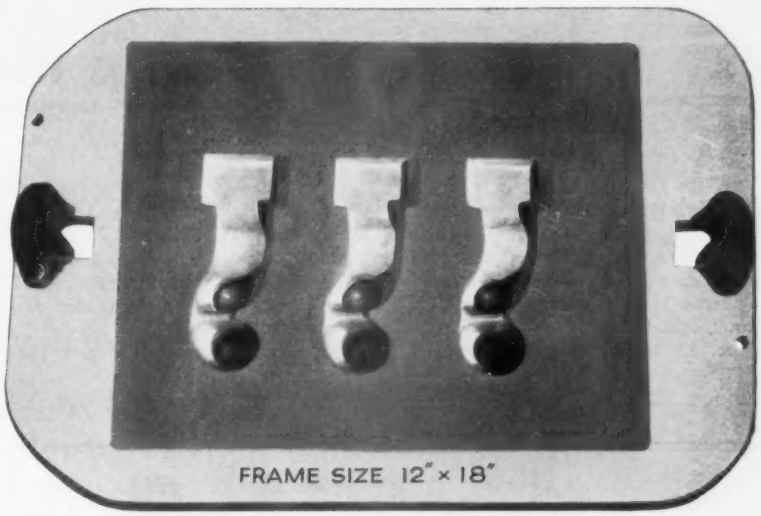
The new definitions, as they apply to government procurement, are designed to permit a greater measure of equity and to recognize the factor of dominance in the industry, regardless of the number of employees. It is hoped that these changes for foundries and other business operations will increase the amount of federal purchasing from small businesses. The total dropped from 21.5 per cent to 19.6 per cent in the period from July, 1955 to June, 1956.

Booklet Hits Historical-Cost Tax Depreciation System

"American industry will pay income tax this year on something like $6 billion of capital consumption," according to the latest in a series of studies on depreciation made by the Machinery and Allied Products Institute, Washington.

The study concludes that "This is a curious state of affairs in a country as devoted as this one to the idea of progress, economic expansion, and rising standards of living. For the taxation of capital consumption as income is not only inequitable, it has one certain effect: The retardation of progress through curtailment of the funds available to industry for capital investment. Under present conditions historical-cost tax depreciation is a 'built-in' decelerator of progress."

This study, entitled *Underdepreciation from Inflation*, is available from the institute, at 1200 Eighteenth St. N. W., Washington, D. C., for 25 cents per copy.



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Foundry Group Meetings

Pittsburgh: About 100 members of the AFS chapter heard Norman A. Birch talk on "Nonferrous Foundry Practice," on Feb. 18. The meeting was held in the Webster Hall Hotel, Pittsburgh.

Mr. Birch is director of research, National Bearing Division, American Brake Shoe Co., St. Louis. He drew upon experience in process and product development in his talk which covered all grades of recognized copper-base alloys.

Mr. Birch discussed several reasons for slow development of technical knowledge in some copper-base foundries. "These industries are often lax in adapting good research practices to their operations," he said. "Often, lack of technical understanding is due to the large number of alloys which are melted in a typical copper-base foundry. In addition, the ingotmaker generally is considered the repository of all technical knowledge.

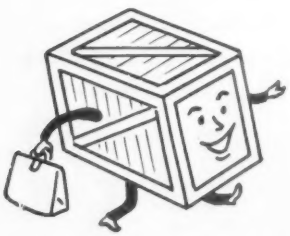
"Brass and bronze foundries haven't been forced to develop metallurgical understanding which ferrous foundrymen have learned," the speaker added. He suggested that one solution to the problem would be a reduction in the number of alloys melted by a foundry. "We believe that 95 per cent of our requirements can be satisfied by cutting down to 20 basic alloys," he reported.

"Copper-base foundries may be small in tonnages, as compared with ferrous foundries, but we are important in dollar volume," Mr. Birch pointed out, as he emphasized the importance of developing high quality practices. His talk placed particular emphasis on molding techniques including sand molding, permanent molding, shell molding and centrifugal casting.—*Robert M. Love.*

East Texas Section: "Induction Melting of Ferrous and Nonferrous Metals," as discussed by William F. Hipple, assistant sales manager, Ajax Electrothermic Corp., Trenton, N. J., attracted 42 members and guests to the Feb. 22 meeting of the AFS chapter at Marshall Hotel, Marshall, Tex.

Slides showed principles of operation of the melting unit as well as various installations. Versatility of the unit was emphasized by use of several sizes being powered by one generator set. The same furnace can melt either ferrous or nonferrous metals.—*C. Eugene Silver.*

Providence Non-Ferrous: Joseph D. Allen Jr., chief technical sales engineer, Eastern Dept., Federated Metals Division, American Smelting & Refining Co., addressed the Non-Ferrous Founders' Society, Providence, R. I., on Feb. 13. In his talk, "New Alloys for the Foundry," Mr. Allen pointed out that many foundries may be overlooking potential business that can be realized



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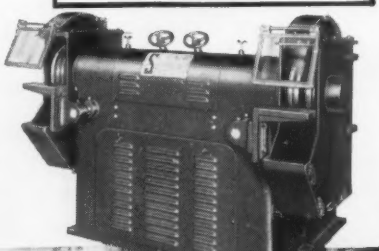

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These AO Specially Tanned Cowhide Quality Heat Gloves and Mittens Give You Both! . . .

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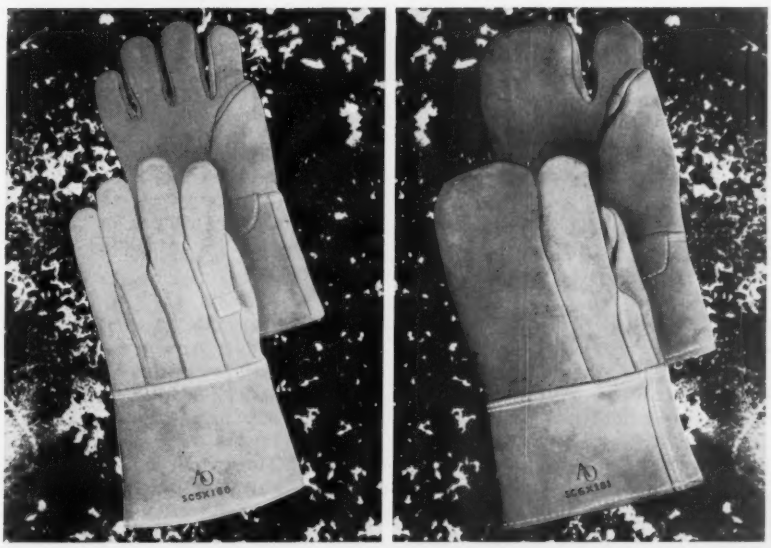

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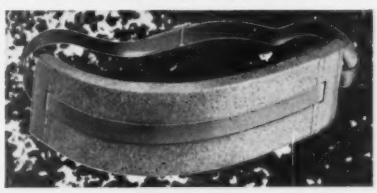
AO SC6X151 ONE-FINGER MITTEN. Chrome tanned split cowhide. Heavy lining makes splendid heat barrier. 4″ leather cuff, lined. NOTE: Also available in full mitten as AO SC6X180.

A glove or mitten that will wear longer is always a good buy. A glove or mitten that gives top protection against heavy heat exposures *plus* longer wear is an even better buy!

The American Optical heat gloves shown are *best values* for operations involving heat where hard wearing qualities, not found in asbestos* are required — such as die casting, drop forging, block bending in shipyard work, steel mill coil tying and similar jobs. These gloves and mittens are specially tanned cowhide, feature full heavy liners and can also be ordered with *heavy lined duck cuffs* in lieu of leather, thus offering additional savings. Buy the best . . . It costs no more! Your nearest American Optical Safety Products Representative can supply you.

*American Optical high heat gloves will handle many foundry operations as well as asbestos and are considerably lower in price.



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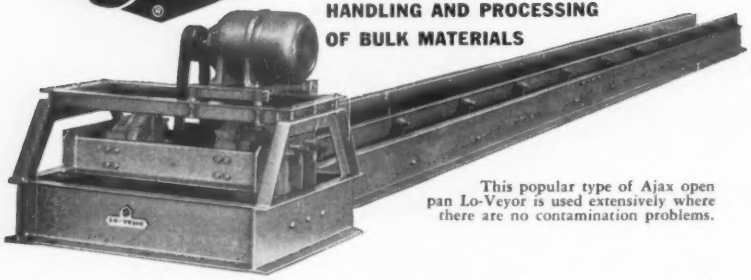

This popular type of Ajax open pan Lo-Veyor is used extensively where there are no contamination problems.

AJAX Lo-Veyors are made in lengths from 3 feet up. They are available in open pan or booted cover types to safeguard critical processes or formulas against contamination. Conveyor pans can be arranged for simultaneous screening, washing, drying, cooling and other operations. Stringy, elongated, abrasive, fine or course mesh materials never hang up while being conveyed in Ajax Vibrating Lo-Veyors. The positive upward and forward tossing action keeps materials flowing freely and evenly.

Tubular type Ajax Lo-Veyors provide sealed, gas tight operation in closed systems under vacuum or pressure. Diaphragm seals can be used where tube passes through walls of processing plants.

Ajax Vibrating Lo-Veyors are self-contained, require little head room for drive and pan, are easily and quickly installed on or below floor levels or suspended from walls or ceilings. Made in a wide range of sizes and lengths, they are being used from beginning to end in progressive processing.

Write for Bulletin 39

AJAX FLEXIBLE COUPLING CO. INC.
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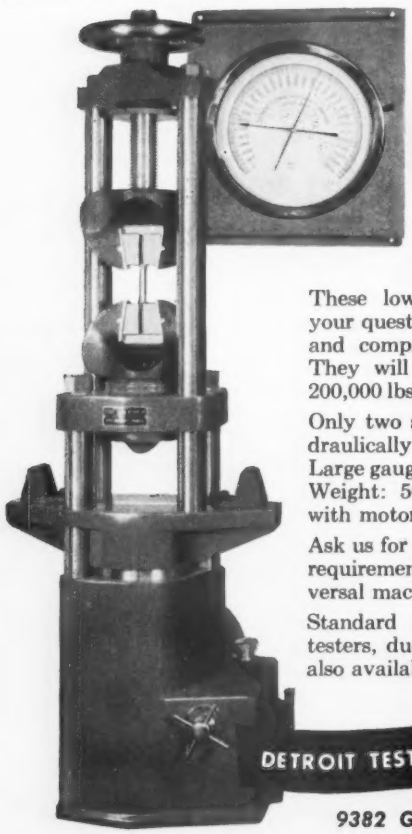

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through working with alloys other than bronze or aluminum. Advances in aviation, electronics and atomic energy are offering foundries a chance to enter new fields in producing sand and permanent mold castings from alloys such as zinc, tin, lead, magnesium, etc.

Philadelphia: One hundred twenty members and guests of the AFS chapter assembled at the Engineers Club, Philadelphia, on Feb. 8, and heard Charles C. Reynolds, assistant professor of metallurgy, Massachusetts Institute of Technology, report on "Developments in the Foundry Industry." Dr. Fred Dunkerley, Rolle Mfg. Co., served as technical chairman.

The speaker reported that MIT is expanding its curriculum of foundry study and is considering graduate work in the program. The institute is continually working with the foundry industry and currently is working on these projects: 1. Ductile iron. 2. Twenty high strength alloys, controlled alloys and impurities, magnesium and elevated temperatures in alloys. 3. Melting—increased interest in basic and neutral cupolas. 4. Controlled mixing vs. natural mixing considering rotating ladles. 5. Sands, binders and cereals. 6. Gas injection. 7. Shell molding.—*E. C. Klank, Philadelphia Coke Co.*

Michiana: Edward C. Zuppann, foundry engineer, Oliver Corp., South Bend, Ind., spoke on "Foundry Sands" at the February meeting of the AFS chapter.—*R. G. Wiest, Dalton Foundries Inc.*

Chicago: The AFS chapter used its March 4 meeting to kick off its 1957 educational series on "Sand." Jerome R. Young, senior process engineer, Cadillac Motor Car Division, General Motors Corp., Detroit, spoke on the "Automated Sand System," a subject which set the stage for succeeding sessions of the educational program on March 11 and March 18. The dinner at the Chicago Bar Association was attended by 235 chapter members and guests.

Membership committee activities were reported by its director, Don G. Schmidt, metallurgist, H. Kramer & Co. Total membership has reached 941. The next chapter meeting will be held on Monday, April 29, to avoid conflict with the AFS annual meeting in Cincinnati, May 6-10. Educational Committee Chairman Donald E. Meves, research metallurgist, American Steel Foundries, introduced the evening's speaker.

In his opening remarks, Mr. Young

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stated that a foundry must be using its present facilities fully before considering the installation of additional equipment. And, further, that only careful study can show what can be accomplished in making some operations fully automatic.

Mr. Young described, with the aid of slides, the highly automated sand system in the Cadillac foundry. This shop is exclusively gray iron and produces castings varying in weight from ½ lb to 340 lb.

Program for the April 1 meeting will feature four roundtable sessions. At the Gray Iron division roundtable, H. H. Hursen, project engineer, Griffin Wheel Co., will present a motion picture showing the "Unusual in Foundry Practice." Malleable and Pattern divisions will combine to hear Robert Cech, malleable foundry engineer, National Malleable & Steel Castings Co., discuss "Gating and Risering." The Steel and Maintenance divisions also will meet jointly for a discussion of the "Powder Cutting and Washing Technique" by J. E. Fitzwater, supervisor of welding section, Manufacturing Research, International Harvester Co. Ray Cochran, metallurgist, R. Lavin & Sons Inc., will speak to the Nonferrous division on "Melting of Nonferrous Metals."—*Erle F. Ross*

Oregon: John A. Mueller, manager, Grinding Laboratory, Product Engineering Branch, Bonded Abrasives Division, Carborundum Co., Niagara Falls, N. Y., addressed the AFS chapter on Feb. 13 at the Heathman Hotel, Portland, Oreg. His topic was "Save on Snagging and Cutoff."

A grinding wheel of open structure cuts faster, but also wears away faster than one of closed structure. To figure snagging and cutoff costs, a manufacturer must weigh abrasive consumption against labor costs and the price of power. Grinding wheels operate most efficiently at the maximum speeds available under safety code limitations. Slides were shown to highlight various points.—*William Walkins, Electric Steel Foundry Co.*

Northwestern Pennsylvania: Amity Inn, Erie, Pa., was the scene of the AFS chapter meeting on Jan. 28 as 99 members and guests gathered to hear Earl E. Woodliff, Foundry Sand Service Engineering Co., Detroit, talk about "Almost Every Foundry Can Have Better Sand."

In discussing ways and means of improving sand practice in foundries, the speaker emphasized the necessity of proper specifications of sand prior to purchasing so that the purchasing agent can be guided properly. The importance of fines, the harm done by excessive mulling, clay content, tempering procedures and sand additives were among the topics discussed.—*Walter J. Yahn, American Sterilizer Co.*

Northeastern Ohio: A double-barreled program attracted more than 200 members and guests to the AFS chapter's Feb. 14 meeting, at the Tudor Arms Hotel, Cleveland. Prominent among the persons at the speakers table were several representatives of the Cleveland Board of Education and the Cleveland Trade School, where ex-chapter chairmen Frank Cech and Jim Goldie turn out pattern and foundry trainees for area foundries.

Foundrymen heard Howard H. Wilder, Vanadium Corp. of America, Chicago, speak on "Practical Cupola Operation." He emphasized the importance of proper cupola operation and control and covered such points as bed height, amount of blast air, the effect of charge permeability and results to be expected from alloy ad-

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For Better Melting

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ditions.

With respect to hot blast operation, he expressed the opinion that it trades the cost of oil or gas to heat the air for any saving achieved in the amount of coke charged into the cupola.

Permeability of cupola charges also is a factor in satisfactory operation. Desirable permeability is achieved if coke size does not exceed one-twelfth and metal one-third the cupola diameter. Also, only the minimum amount of limestone required to do the slagging job should be used.

He also reported results of a survey conducted recently among foundrymen. It indicates that their biggest problems are proper coke and carbon control and separation of charges in the cupola. Major scrap difficulties are attributed to faulty melting practice, which results in castings with low carbon shrinks and entrapped gas.

At a separate technical session sponsored by the patternmakers' division of the chapter, more than 75 persons heard Joseph W. Tierney, Plastic Tooling Division, Houghton Laboratories Inc., Olean, N. Y., discuss "Plastic Tooling for Foundries." Mr. Tierney stressed two points: 1. Newer plastics, particularly epoxy resins, are vastly superior to those available previously. 2. These plastics can do a fine job in the proper applications, but they are not without their problems.

Epoxy resins offer the most advantages for patternmaking. They are tough, not brittle and have a low shrinkage (½ to 1 per cent) which is controllable. Other good properties include high strength, stability, good adhesive qualities and excellent shelf life. Handling is simple and does not require a lot of equipment. Patterns and coreboxes can be constructed as laminations, with glass cloth, or can be cast—that is, poured solid—in molds, which usually are plaster. A release agent and a wax coat are necessary on molds because of the material's adhesive qualities. To use the material, one must learn the proper techniques. Cheap replacement of wornout equipment is relatively easy with epoxy.—*Robert H. Herrmann and Jack C. Miske.*

Texas: A talk on safety and a panel discussion on sand featured the Feb. 15 meeting of the AFS chapter held at Hotel Beaumont, Beaumont, Tex. Seventy members and guests attended.

J. L. Ennis, works manager, Texas Electric Steel Casting Co., Houston, Tex., gave the safety talk and reported on his company's experiences. To be successful, the program must

arouse the interest of the workmen. New concepts must be introduced continually into the safety program or interest and effectiveness evaporate.

Moderator for the panel on sand was John H. Kimes Jr., metallurgist, Lufkin Foundry & Machine Co., Lufkin, Tex. Panelists were Ross Williams, superintendent, East Texas Steel Casting Co., steel sand; King C. Tetley, plant engineer, Nibco of Texas Inc., Nacogdoches, Tex., nonferrous sand and Fred W. Jacobs, chief metallurgist, Texas Foundries Inc., Lufkin, Tex., ferrous sand.—*C. Eugene Silver.*

Lehigh Valley: The Lehigh Valley Foundrymen's Association met on the campus of Lafayette College, Easton, Pa., on Mar. 12 and heard George F. Watson, ceramic engineer, American Brake Shoe Co., Mahwah, N. J., discuss "Casting Defects Caused by Sand." Robert Mason, general foreman, Treadwell Engineering Co., served as technical chairman.

Preceding the technical session, H. J. Leaver, vice president in charge of production, Treadwell Engineering Co., spoke on "An Engineer Meets the Casting Industry."

Mr. Watson discussed metal penetration, burnt-on sand, veining and scabbing at considerable length with emphasis on various bronze alloys, steel and gray irons. He offered case histories illustrating some of the theories behind these troublesome defects. Suggestions for elimination of the defects were offered. — *R. B. Fischer, Ingersoll-Rand Co.*

Chesapeake: Bernard N. Ames, president, Columbian Bronze Corp., Freeport, L. I., N. Y., spoke on CO_2 molding before the AFS chapter at its Mar. 1 meeting. He described molding small and large ship propellers, claiming it to be economical as the castings were true to pattern and required minimum grinding and trimming.

Slides were shown illustrating the introduction of gas to the under side of the pattern. Two or three inches of facing sand for CO_2 treatment is all that is required. The remainder may be backed up with ordinary molding.—*Joseph O. Danko Sr., Danko Pattern Co.*

Missouri School of Mines: The student chapter of the AFS held its annual meeting with the St. Louis chapter on Feb. 8. Nine members of the St. Louis group journeyed to Rolla, Mo., to join the 80 students who were present. Robert Robinson, Central Foundry Division, General Motors Corp., Danville, Ill., presented a film highlighting the procedures

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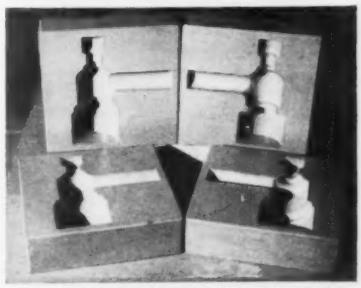

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used in manufacturing Armasteel crankshafts by shell molding.—*Donald G. Pfanstiel.*

Utah: The AFS chapter and American Society for Metals chapter met jointly in Salt Lake City, Feb. 13, to hear Kenneth L. Clark, International Nickel Co., talk on "Ductile Iron." He told the group that ductile iron appeals to foundrymen because of machinability, low melting point, fluidity, ductility and elasticity. Tensile strength range is from 60,000 to 150,000 psi, elongation of 15 per cent, is tough and wear resistant, can be welded and has no high temperature distortion.—*J. Merrill Bushnell, Pacific States Cast Iron Pipe Co.*

San Antonio Section: Forty-two members and guests of the chapter held a general discussion of gating and risering problems at the Alamo Iron Works, San Antonio, Tex., on Jan. 21. Refreshments were sponsored by the San Antonio Machine & Supply Co.

On Feb. 18, 31 members of the chapter met to participate in a general discussion of "Shifts in Snap-flask Molding—Their Causes and Cures." Refreshments following the meeting were served by the Alamo Iron works.—*Kenneth D. Kielty, AlamoIron Works.*

St. Louis: At the February meeting of the AFS chapter, O. Jay Myers, Foundry Division, Reichold Chemicals Inc., White Plains, N. Y., evaluted the pros and cons of four major core-making processes. Conventional, shell core, air setting binder and sodium silicate mixtures were considered with emphasis upon the advantages, disadvantages and general applications of each.—*Ralph Johnston, East St. Louis Castings Co.*

Foundry Conference Scheduled For Michigan State University

Plans are in progress for the 1957 annual Michigan Regional Foundry Conference. It will be held Oct. 3-4 at Kellogg Center, Michigan State University, East Lansing, Mich., under sponsorship of that school, University of Michigan, and Michigan chapters of the American Foundrymen's Society.

R. B. Kropf, International Nickel Co. Inc., Detroit, is conference chairman, with W. E. Truckenmiller, Albion Malleable Iron Co., Albion, Mich., vice chairman. Jerome R. Young, Cadillac Motor Car Div., is conference secretary, C. C. Sigerfoos, Michigan State, is conference treasurer, and Jess Toth, Harry W. Dietert Co., Detroit, is permanent executive secretary-treasurer.

Chairmen appointed for the various conference committees include: Program, Mr. Truckenmiller; publicity, Douglas Strong, Foundries Materials Co., Coldwater, Mich.; student activities, Henry LaForet, Pontiac Motor Car Div.; banquet, Robert Dodge, Archer-Daniels-Midland Co., Detroit; reception and arrangements, Verne Sadler, General Foundry Co.

Philadelphia Hosts East Coast Foundry Conference, Apr. 12-13

Philadelphia's Benjamin Franklin Hotel will be headquarters for the East Coast Regional Foundry Conference, Apr. 12-13, sponsored by the Philadelphia, Chesapeake and Metropolitan chapters of the AFS. Walter S. Giele, W. S. Giele Co., Lebanon, Pa., is general conference chairman. Cochairmen are Lewis H. Gross, American Standard Corp., Baltimore, Md., and R. H. Colton, American Smelting & Refining Co., Newark, N. J. Mr. Colton also is serving as program chairman.

Other conference committee chairmen are: Reception, H. R. Williams, George F. Pettinos Inc.; Publicity, E. C. Klank, Philadelphia Coke Co.; Treasurer, H. E. Mandel, Pennsylvania Foundry Supply & Sand Co., and Secretary, D. A. Roemer, Franklin-Balmar Corp. The conference program follows:

Friday, Apr. 12

8:30 a.m.—Registration.

9:30 a.m.—Opening Remarks: Walter Giele, Walter Giele Co., Lebanon, Pa., general conference chairman. Welcome: William A. Morley, Olney Foundry Division, Link-Belt Co., Philadelphia, national AFS director. Message from National Headquarters: H. W. Dietert, AFS national vice president. Presiding, Howard Voit, Sterling Wheelbarrow Co., Hackensack, N. J., vice chairman, Metropolitan Chapter.

9:45 a.m.—"Plastics as Bonding Materials." O. J. Myers, Reichhold Chemicals Inc., White Plains, N. Y.

10:30 a.m.—"New Ideas for the Patternmaker." Melvin Young, U. S. Gypsum Co., Chicago.

11:15 a.m.—Coffee break.

11:30 a.m.—General Discussion. Presiding, D. A. Roemer, Franklin-Balmer Corp., Baltimore, vice chairman, Chesapeake Chapter.

1 p.m.—Luncheon: Speaker, Harry Kessler, Sorbo-Mat Process Engineers, New Brunswick, N. J. Presiding, Henry Winte, Florence Pipe Foundry & Machine Co., Florence, N. J., vice chairman, Philadelphia Chapter. Technical chairman, Clyde Jenni, General Steel Castings Corp., Eddystone, Pa.

2:30 p.m.—"Metallurgical Requirements for Atomic Applications." Dr. J. M. Simmons, Atomic Energy Commission.

3:30 p.m.—"Applications of Radioactive Materials in the Foundry." Dr. William A. Pennington, University of Maryland.

7 p.m.—Banquet. Presiding, R. A. Colton, Federated Metals Division, American Smelting & Refining Co., Newark, N. J., chairman, Metropolitan Chapter. Speaker, Dr. Kenneth McFarland, General Motors Corp., Detroit.

Saturday, Apr. 13

9 a.m.—"Carbon Dioxide Process," W. E. Gruver, Meehanite Metal Corp., New Rochelle, N. Y.

9:45 a.m.—"Diaform Molding Equipment," Tom Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago.

10:30 a.m.—Coffee break.

10:45 a.m.—"Shell Mold and Coremaking Equipment," Otto W. Winter, Beardsley & Piper Division, Chicago.

11:30 a.m.—"Vibrating Conveyors in the Foundry," J. M. Morris, Carrier Conveyor Corp., Louisville. Presiding, Lewis H. Gross, American Radiator & Standard Sanitary Corp., Baltimore, chairman, Chesapeake Chapter.

Foundry Instructors Seminar Is Scheduled by AFS

Second annual Foundry Instructors Seminar of the American Foundrymen's Society will be held June 20-22 at Michigan State University, East Lansing, Mich.

This seminar is intended to acquaint foundry and patternmaking instructors from vocational and high schools with developments in casting technology and personnel requirements.

In addition to various talks and workshop sessions, the program will include an inspection trip to Engineering Castings Inc., Marshall, Mich.

Program details follow:

Thursday, June 20

8:30 a.m.—Registration.

10 a.m.—Welcome and introductions.

10.10 a.m.—"What's New with Metal Castings."

11:10 a.m.—AFS and the Training Institute.

12 noon—Luncheon — Foundry Educational Foundation.

2 p.m.—AFS Robert E. Kennedy Memorial Apprentice Contest.

2:15 p.m.—Foundry Manpower Needs (Government report.)

2:45 p.m.—"In-Plant Training."

3:15 p.m.—"Major Points for Co-ordinating the School-Industry Program."

4 p.m.—Recess and departure on inspection trip, Engineering Castings Inc., Marshall, Mich.

Friday, June 21

9 a.m.—Industrial Arts and Cast Metals.

10 a.m.—Projects Report and Industrial Arts Guide.

10:30 a.m.—"What the Teacher Expects from the Industry."

11 a.m.—"What the Industry Expects from the Student."

11:30 a.m.—Luncheon—Film, "The American Engineer."

1:30 p.m.—Work Shops: Unit Shop Curriculum in Cast Metals; Vocational Co-ordination for Cast Metals; Industrial Arts Projects for Cast Metals; Plant Layout for Industrial Arts; Plant Layout for Vocational Programs; Industrial Arts Curriculum.

3:30 p.m.—Group chairmen compile their reports, using group.

4 p.m.—Group reports from workshops.

5 p.m.—Social hour.

6 p.m.—Dinner—"The Cast Iron Cow."

Saturday, June 22

8:30 a.m.—"The Common Sense of Foundry Safe Practices."

9:30 a.m.—Demonstration Aids, Texts and Course Materials.

10:30 a.m.—"Shakeout."

11:45 a.m.—Getaway luncheon.

1 p.m.—Open House—Michigan State University foundry. Evaluation Committee meeting.

Book Review

Elements of Engineering Materials by Charles P. Bacha, Joseph L. Schwalie and Anthony J. Del Mastro, cloth, 494 pages, 6 x 9 in., published by Harper & Bros., 49 East 33rd St., New York 16, N. Y. Price $6.50.

An introductory text on the elements and applications of engineering materials, this book is written for students in all branches of engineering. All engineering materials have been considered along with the latest practices available in each field. Chapters on the structure of metallic materials, behavior under load, corrosion and its prevention and the shaping and forming of metallic materials have been included.

Because of the wide range of material covered, each topic is given a comparatively brief, but fundamental treatment. Subjects common to all branches of engineering are considered in the early chapters so the reader will have a background for the later discussion of metals, corrosion, cementing, etc. A list of references for further study is included.

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Circle 728 on Inquiry Card—Page 51

How Much Is Overtime Pay Costing Your Foundry?

How To Compute Overtime Pay for All Employees

By Robley D. Stevens

IN THE compensation of employees, overpayments as well as underpayments for overtime work can be a real source of grievances and even of government investigation. Yet your foundry may be paying a larger overtime bill than it has to because it may be using the wrong method of computing overtime.

Employees should be paid for overtime on the basis of one and one-half times their regular rate; however, no particular method of payment is required. Employees may be paid on a salary, hourly, day or piece-rate basis. In any event, wage-hour inspectors are prepared to delve into all forms of computation of overtime pay. Now is the time to check up overtime pay practices, not later on when an inspector may audit your books.

Employees who qualify for exemption from overtime in the capacity of a supervisor must meet simplified "tests" of duties, responsibilities, salary and other requirements for such eligibility. Foundry employees may work any number of hours weekly so long as they are paid overtime for work beyond normal requirements.

A work week is considered to be a regularly recurring period of 168 hours—seven consecutive 24-hour periods. It may begin on any day of the week and at any hour of that day.

The term "regular rate" is defined to include all remuneration except seven types of payments listed later and commonly referred to as statutory exclusions.

The best thing to do, of course, is to have an accountant audit the books. Or, you may want to use the following quick checklist of common methods of computing overtime.

1. Foundry Hourly Rate Employee—If an employee is employed solely on the basis of a single hourly rate, the hourly rate is his regular rate. For his overtime work he should be paid 1½ times his straight-time hourly earnings for all hours worked in excess of 40 in the work week.

Suppose, however, that in addition to the earnings at the hourly rate, a production bonus of $4.60 is paid. If the man works 46 hours at a straight-time rate of $1.40, with the bonus the regular hourly rate should be $1.50 an hour (46 hours at $1.40 yields $64.40; the addition of the $4.60 makes a total of $69.00; this total divided by 46 hours yields a rate of $1.50). In that case, the employee is entitled to be paid a total wage of $73.50 for 46 hours (46 hours at $1.50 plus 6 hours at 75 cents).

2. Foundry Pieceworker—If an employee is employed on a piece-rate basis, his regular hourly rate of pay should be computed by adding his total weekly earnings from piece rates and all other sources, such as production bonuses and any sums paid for waiting time or other hours worked, except statutory exclusions. To yield the pieceworker's regular rate for that week, this sum should be divided by the number of hours worked in the week for which such compensation was paid.

So for his overtime work the pieceworker is entitled to be paid, in addition to his total weekly earnings, a sum equivalent to one-half the regular rate of pay multiplied by the number of hours worked in excess of 40 in the week. However, only additional half-time pay should be required in such cases since the employee has already received straight-time compensation at piece rates for all hours worked.

Thus, if an employee has earned $66.00 at piece rates for 46 hours of productive work and, in addition, has been compensated at $1 an hour for 4 hours of waiting time, his total compensation—$70—should be divided by his total hours of work—50—to arrive at his regular hourly rate of pay—$1.40. For the 10 hours of overtime, the employee is entitled to additional compensation of $7 (10 hours at 70 cents). For the week's work he is entitled to a total of $77 (equivalent to 40 hours at $1.40 plus 10 hours at $2.10).

In some instances an employee is hired on a piece-rate basis coupled with a minimum hourly guarantee. Where the total piece-rate earnings for the week fall short of the amount that would be earned for the total hours at the guaranteed rate, the employee should be paid the difference. In such weeks the employee is in fact paid at an hourly rate and the minimum hourly guarantee which he was paid is his regular rate for that week.

In the example given before, if an employee was guaranteed $1.50 an hour for productive working time, he should be paid $69 (46 x $1.50) for the 46 hours of productive work (instead of the $66 earned at piece

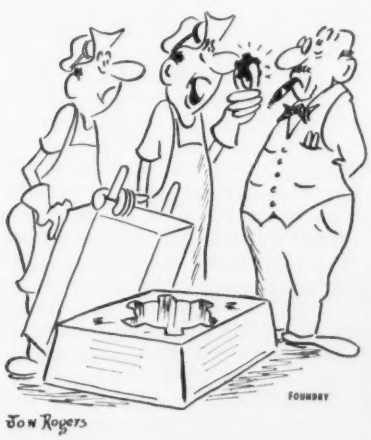
rates). In a week in which no waiting time was involved, he is owed an additional 75 cents (half-time) for each of the 6 over-time hours worked, to bring his total compensation up to $73.50 (46 hours at $1.50 plus 6 hours at 75 cents or 40 hours at $1.50 plus 6 hours at $2.25). If he is paid a different rate for waiting time, his regular rate is the weighted average of the two hourly rates.

3. Foundry Day Rates and Job-Rated Employees—If an employee is paid a flat sum for a day's work or for doing a particular job, without regard to the number of hours worked in the day or at the job, and if he receives no other form of compensation for services, his regular rate should be determined simply by totaling all the sums received at such day rates or job rates in the work week and then dividing by the total of hours actually worked. He then is entitled to extra half-time pay at this rate for all hours worked in excess of 40 during the week.

4. Foundry Salaried Employees (General)—If an employee is employed solely on a weekly salary basis, his regular hourly rate of pay on which time and a half should be paid is computed by dividing the salary by the number of hours which the salary is intended to compensate. Suppose an employee is hired at a salary of $56 and if it is understood that his salary is compensation for a regular work week of 35 hours, the employee's regular rate of pay is $56 divided by 35 hours, or $1.60 an hour. When he works overtime, he is entitled to $2.40 for each hour over 40. If an employee is hired at a salary of $56 for a 40-hour week, his regular rate is $1.40 an hour. If his salary is $56 for a 50-hour week, his regular rate is $1.12 per hour.

Where the salary covers a period longer than a work week, such as a month, it should be reduced to its work-week equivalent. A monthly salary is subject to translation to its equivalent weekly wage simply by multiplying by 12 (number of months) and dividing by 52 (number of weeks). A semimonthly salary also is to be translated into its equivalent weekly wage by multiplying by 24, then dividing by 52. Under the wage-hour rule, however, once the weekly wage is arrived at, the regular hourly rate of pay should be calculated as was explained earlier.

5. Foundry Salaried Employees (Irregular Hours)—If an employee earns $66 per week with the understanding that his salary is to cover all hours worked and if his hours of work fluctuate from week to week, his regular rate of pay will vary from week to week and will, of course, be the average hourly rate each week. He must, however, also be paid extra half-time (half the hourly rate) for hours worked in excess of 40. Suppose, for example, that during the course of 4 weeks



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HIGH-SPEED
STAND
GRINDERS

HIGH-SPEED PRODUCTION
FOR THE FOUNDRY

Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
2. Less space is required for each installation.
3. Proper operating room is provided on either side of the wheel.

These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

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FOX GRINDERS, Inc.
OLIVER BUILDING PITTSBURGH 22, PA.

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Temperature readings of molten nonferrous metals are only accurate when taken below the surface, unaffected by dross and other surface conditions. That is why there is industry-wide acceptance of the Alnor Pyro Lance.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip. Enclosed couple is protected against flame, fumes and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Circle 730 on Inquiry Card—Page 51

an employee works 40, 44, 50, and 47 hours at $66 per week. His regular hourly rate of pay in each of these weeks is approximately $1.65, $1.50, $1.32, and $1.40, respectively.

Since the employee already has received straight-time compensation on a salary basis for all hours worked, only additional "half-time" pay should be due. For the first week the employee should be paid $66; for the second week $69 (40 hours at $1.50 plus 4 hours at $2.25); for the third week $72.60 (40 hours at $1.32 plus 10 hours at $1.98); for the fourth week $70.90 (40 hours at $1.40 plus 7 hours at $2.10).

6. Employees Working At Two Rates — Where an employee in a single work week works at two or more different types of work for which different basic hourly rates have been established, his regular rate for that week is the weighted average of such rates. That is, except for statutory exclusions, his total earnings from all such rates should be divided by the total number of hours worked at all jobs.

Excluded Pay—In the process of computing overtime the following types of payments are considered to be excluded from the employee's regular rate because they are provided for in the so-called statutory exclusions.

1. Sums paid as gifts made at Christmas or on other special occasions.

2. Payments made for occasional periods when no work is performed because of vacation, holiday, illness or failure of the employer to provide sufficient work.

3. Sums paid in recognition of services determined at the discretion of the employer and not causing the employee to expect such payments.

4. Contributions made by the employer to a pension, retirement, life, accident or health insurance plan.

5. Premiums for work above the daily and weekly standards.

6. Premiums for work on Saturdays, Sundays, holidays, regular days of rest or the sixth or seventh days of the work week.

7. Premiums for work outside the regular work day or work week.

If, however, payments are made to employees in the form of goods or facilities which are regarded as part of wages, the reasonable cost to the employer of such goods or of furnishing such facilities should be included in the regular rate.

If an employee incurs expenses on behalf of the employer, reimbursement for such expenses is not included in the regular rate because such payment is not compensation for services rendered.

The solutions to reducing and controlling overtime pay must be worked out according to management's policy of paying compensation. Tne old stumbling block is still tripping up many employers. Many unwitting violations are caused by misunderstanding the wage - hour rules on overtime pay.

American Standards Association Approves Conveyor Definitions

American Standards Association has approved "Conveyor Terms and Definitions," B75.1-1956, UDC 621.867:001.4, the industry dictionary published by the Conveyor Equipment Manufacturers Association. The popular 64-page dictionary, published in 1952, defines nearly 1500 terms applied to conveyors and conveyor equipment and contains nearly 100 line drawings.

Copies of the guide have been placed in American Standards Association libraries throughout the world and conveyor manufacturers are providing copies to state safety officials to help overcome confusion as to safety provisions that must be applied to conveyors.

Copies are available from Conveyor Equipment Manufacturers Association, 1 Thomas Circle, Washington 5, at $1 each.

Book Review

1956 *Supplement to Book of ASTM Standards and Tentatives*, Part 1, *Ferrous Metals*, paper, 452 pages, 6 x 9 in. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3.

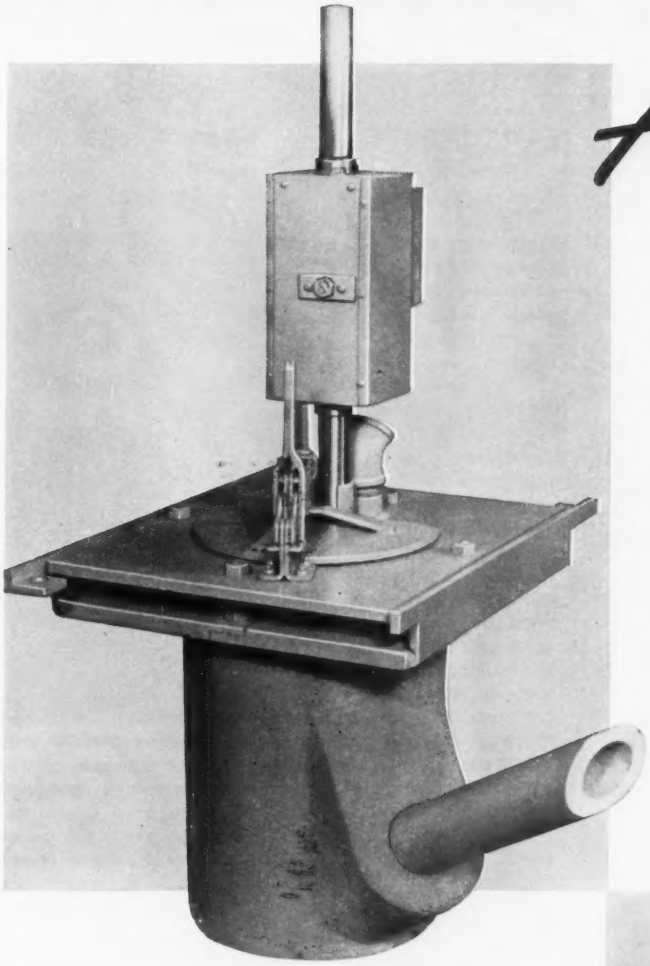
This first yearly supplement to the 1955 *Book of ASTM Standards* contains 58 revised standards and new and revised tentatives in the field of ferrous metals which have been accepted by the society since the appearance of the 1955 edition. Eight of the nine standards are replacements of existing standards, and one standard represents a tentative revised and adopted in 1956. Of 49 tentatives, 28 are replacements of existing tentatives, 2 are standards revised and reverted to tentative, and 19 are published for the first time. Two of the revised tentatives relate to steel castings, and two revised standards and two tentatives pertain to cast iron. In addition the supplement contains yellow stickers for attachment in the appropriate sections of the 1955 edition to draw attention to the respective changes.

Automatic casting of Aluminum *now practical*

with *New* LINDBERG-FISHER

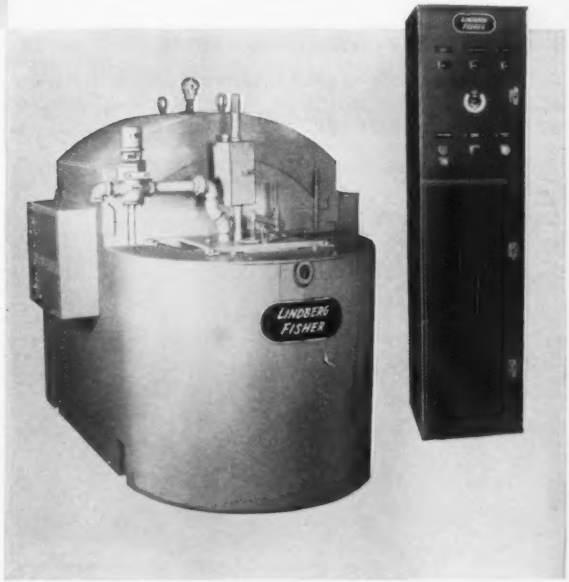
We call it "LITTLE JOE"

Autoladle



To the best of our knowledge the Autoladle is the first practical automatic aluminum ladling unit yet divised. Thoroughly tested and proven in service, the Autoladle is adaptable to induction, electric resistance or fuel fired reverberatory furnaces. In any installation it offers these advantages:

- Ladled metal is withdrawn from beneath surface of bath.
- Precise, accurate control of any size shot up to 30 lbs.
- No interruption of the casting cycle during charging of metal.
- No variation of size of shot due to metal level changes.
- Composed of special refractory materials so arranged that ladled metal cannot come in contact with any metal.



At the right, "Little Joe" is shown installed in a Lindberg-Fisher electric resistance aluminum holding furnace. With it is the panel cubicle and controls which is supplied completely assembled and wired. For complete information on the Autoladle get in touch with your nearest Lindberg Field Representative (See your classified phone book) or write us direct.

LINDBERG FISHER

A Division of Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

The Shakeout

Use Ultrasonics To Solder Aluminum

ULTRASONIC soldering equipment is reported to provide an efficient and convenient means of soldering aluminum and its alloys. Ultrasonic power is applied to the surface of the metal through molten solder, and the cavitation effects produced in the solder completely

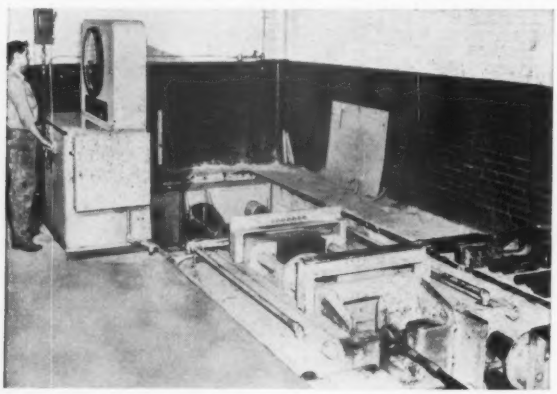
remove the oxide film on the metal so that tinning takes place. The oxide dross appears on the surface of the solder and is removed easily by wiping. No flux is required.

Applications of ultrasonic soldering include fabricating or altering aluminum patterns, rectifying defects in aluminum castings, bonding aluminum cables and performing assembly work. In the accompanying illustration, a Mullard ultrasonic soldering iron made by Acoustica Associates Inc., Glenwood Landing, L. I., N. Y., is being used to repair a blowhole.

For More Details Circle No. 472—Page 212

Rope Tester Has 600,000-lb Capacity

A NEW 600,000-lb capacity universal hydraulic tester of wire rope and wire rope slings has been installed at the Wilkes-Barre, Pa., plant of American Chain &

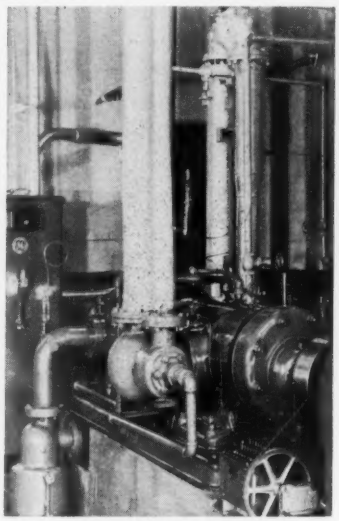


Cable Co., Bridgeport, Conn. Capacity of the new unit is more than twice that of the one it replaced.

The tester incorporates a long test bed in which specimens over 60 ft long can be both prooftested and breaktested. The giant unit was built and installed by Baldwin-Lima-Hamilton Corp., Eddystone, Pa., and is said to be ideal for determining actual breaking strengths of very high strength wire rope products and for proofloading wire rope slings.

Rotary Compressor Gives Yeoman Service

MAINTENANCE MEN at Empire Steel Castings Inc., Reading, Pa., feel that some sort of record has been set by this rotary compressor at their plant. After 32 months, its two-stage rotary compressor was given a routine inspection, and the only repair necessary was replacement of a set of blades in the high-pressure section of the unit. Designed and built by Fuller Co., Catasauqua, Pa., the compressor was installed in 1953. It supplies air in the molding department for pneumatic rammers, mold machines, automatic apparatus for mold conveyors and automatic shakeout machines. In the coremaking department, it supplies air for core machines, spraying and torch-drying equipment and core oven operation.



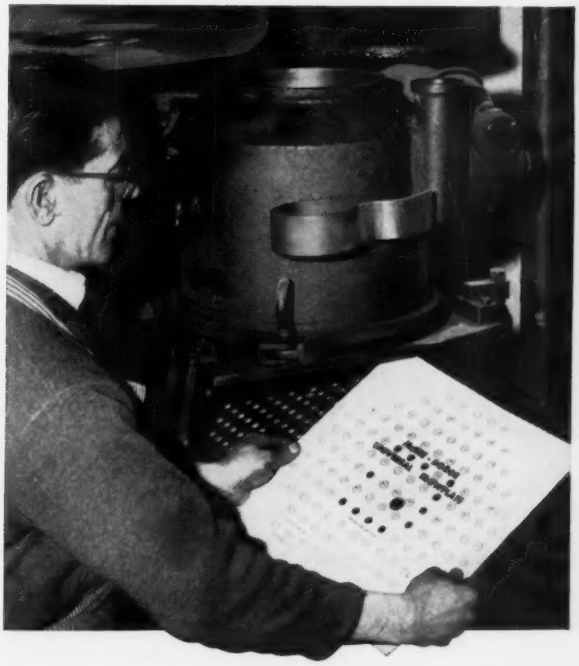
In the cleaning department, it supplies air for pneumatic chipping hammers and grinders, abrasive blasting, pressure testing and miscellaneous equipment. In addition, it supplies air to the heat treating department.

For More Details Circle No. 473—Page 212

Valve Seats Get Bigger All the Time

THIS 13,500-lb cast iron valve seat performs the same function as the damper seat in the stack of a potbellied stove, but on a larger scale. According to the designers, Blaw-Knox Co., Pittsburgh, valves of this type are becoming more and more common as the size of open-hearth steelmaking furnaces increases.

A furnace now in operation in West Virginia, for example, can produce as much as 600 tons of steel in one heat. The opening is 9 x 10¼ ft.



DE LAVAL saves 50% in core blowing with the new McKee-Dodge UNIVERSAL BLOWPLATE*

Here's what Howard Stoeckle, foundry superintendent of the De Laval Steam Turbine Company, Trenton, N.J. has to say about this newest Dodge development . . .

"In a period of 8 months, we can report that the McKee-Dodge Universal Blowplate has saved the company about 50% in core blowing. What's more, it has enabled our production department to set a schedule in order that we may better serve our customers in delivery. The real time savers and features, I think, center around the fact that no vents are required in the boxes, no core rods are required, and the happy fact that the time involved in changing from one job to another is only about one minute."

Shouldn't *you* find out how you, too, can save time and money in your foundry? The time to do it is *now!*

**Patent Pending*

Bulletin FP-855 contains complete details on the McKee-Dodge Universal Blowplate. Write for a free copy.

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THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

1000-lb. hoist places cylinder head on engine. No burned-out motors to stall production.

KELLER TOOL AIR HOISTS

make handling easy as it looks

Speed your handling jobs . . . in assembly, foundries, machine shops, shipping rooms — wherever dependable, controlled raising and lowering are needed.

CHECK THESE FEATURES BEFORE YOU BUY ANY HOIST

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- **ECONOMICAL**—uses much less air than other hoists of same capacity.
- **CONTROLLED SPEED**—from creep to maximum.

Model	Capacity	Speed	Weight
86-2V20	2000 lb.	19 f.p.m.	78 lb.
86-2V20L*	2000 lb.	19 f.p.m.	78 lb.
86-2V10	1000 lb.	35 f.p.m.	78 lb.
86-1V10	1000 lb.	19 f.p.m.	28 lb.
86-1V10L*	1000 lb.	19 f.p.m.	28 lb.
86-1V5A	500 lb.	35 f.p.m.	28 lb.
86-1V3	300 lb.	80 f.p.m.	28 lb.

** Models with link chain*

BULLETIN 86 gives specifications and data on attachments.

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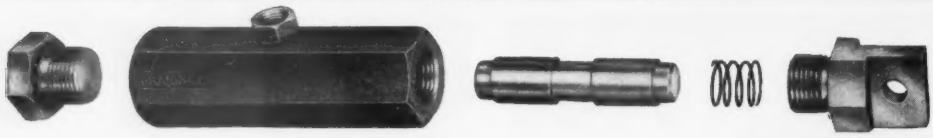

3 steel alloys*

Give Branford vibrators longer life

Strength and durability are built in . . . preserved . . . through specific steel alloys that give each part of each Branford Vibrator the properties it needs for a long serviceable life.

Branford Pistons are built from hard, chrome-coated steel, especially wear resistant to maintain efficient precision over long periods of use.

Springs made from high tensile, flexible steel flex themselves millions of times without fracture . . . without fatigue.

Branford body steel is rugged, tough, ready to take the torture and stress of vibration without breaks, cracks, and without frictional wear.

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Write for your Branford-catalog and the name of your local Branford distributor.

*** Branford Vibrators are built in every size—and in every size they are built from steel throughout (including the bodies).**

THE BRANFORD COMPANY 130 CHESTNUT STREET — NEW HAVEN, CONNECTICUT

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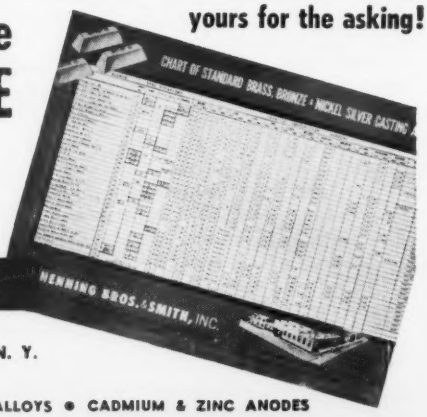

This see-at-a-glance wall chart will save you hours of time in making up your specs. Chart shows all types of customer specifications: Navy, S.A.E., A.S.T.M., and Federal. It shows chemical composition, by percentages, of 37 alloys. Write today for your copy to:

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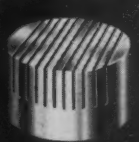
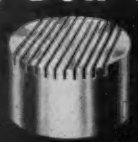
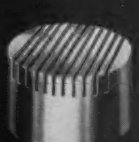
SLOTTED CORE BOX VENTS



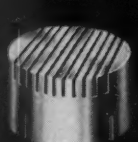
X-TRA DEEP HEAD .156 Wide Slots .014



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010



CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

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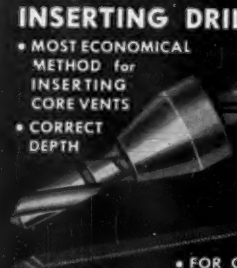
- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT



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- MADE OF TEMPERED STEEL
- EASY TO USE

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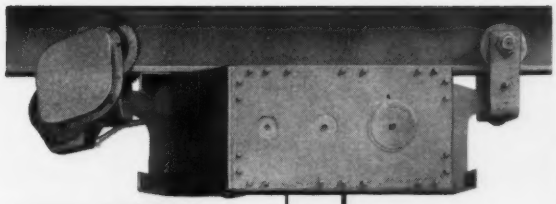

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New light-weight, low-headroom design solves many installation problems – in 3 to 7½ ton capacities; distance between track and eye of hook measures only 21 inches!

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DUAL BRAKING – Regenerative braking built into LeTourneau electric motors automatically regulates load travel . . . has no wearing parts, needs no adjustment. Powerful electro-mechanical brakes stop and hold capacity loads, prevent overtravel.

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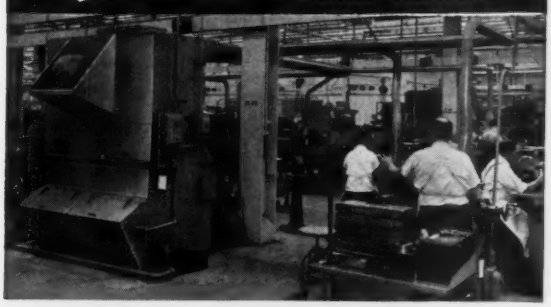
- INDUSTRIAL OVENS
- DUST COLLECTORS
- SPRAY BOOTHS
- PARTS WASHERS



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Compact, complete recirculating Water-Type Dust Collectors for industrial processing dusts. Dirt is collected as wet sludge which may be carried away automatically. No moving parts. Extremely efficient for grinding operations. Eliminates danger of explosion from magnesium and aluminum dust. Proven in foundries. Standard Units available.

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Isn't it time you investigated the alkali fluoborates?

LOOK AT THE ADVANTAGES of B&A Alkali Fluoborates

for aluminum, magnesium casting

Easy handling . . . positive results: B&A alkali fluoborates are easy-to-handle salts which give the foundryman a wide range of benefits when casting magnesium . . . when melting, heat treating or refining aluminum.

You get castings with increased tensile strength, greater elongation, better machinability! Used as a purifying flux in aluminum melting, B&A Potassium Fluoborate improves the mechanical and physical properties of the casting. You add only one to four ounces per hundred pounds of metal!

Simplifies and improves magnesium casting! B&A alkali fluoborates are excellent oxidation inhibitors. Used with both green sand and core sand, they assure fewer rejects . . . easier core making . . . and the resulting cores are faster to collapse, easier to shake out.

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In Blast Furnace and Foundry, Columbia-Southern Soda Briquettes can always be relied upon for efficient action in the desulphurizing and physical cleansing of iron.

Blast Furnace operators can be certain that sulphur analysis specifications will be met for Open Hearth or Bessemer Departments.

In the Foundry, Columbia-Southern Soda Briquettes improve the melting conditions and properties of iron. When added to the melt charge, the slag becomes more fluid and refining value is increased. The release of gases and impurities is speeded for quicker surfacing of spent slag.

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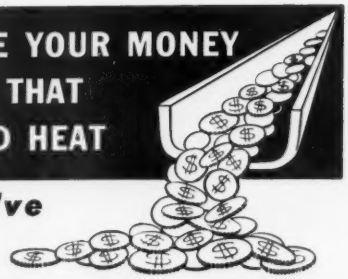
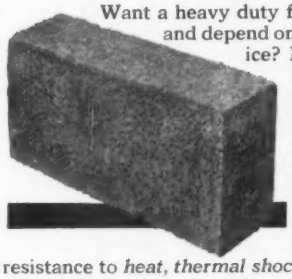
Circle 741 on Inquiry Card—Page 51

DON'T WASTE YOUR MONEY ON A FLOOR THAT WON'T STAND HEAT



Till You've Read This!



Want a heavy duty floor you can lay down *fast* . . . and depend on for *years* of trouble-free service? Investigate EMERI-BRICK*. Made of the same pure CORTLAND EMERY AGGREGATE and Calcium Aluminate Cement as famous *heat resistant* EMERI-CRETE FLOORING, in a convenient precast, precured form, EMERI-BRICK provides a floor with incredible resistance to *heat, thermal shock* and *heavy wear.* That's why leading foundries and steel mills swear by it. Get the facts—write for free information today. Complete specifications provided for every installation.

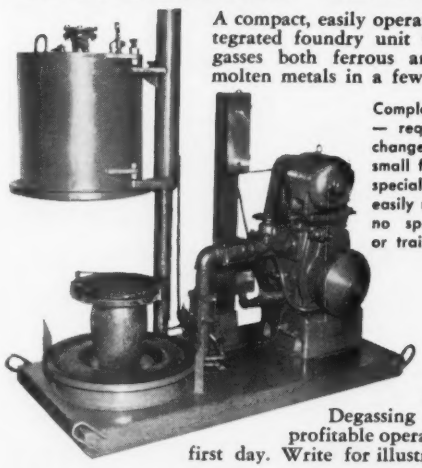
Write for FREE Bulletin HR-2.

EMERI-BRICK

WALTER MAGUIRE COMPANY, INC.
Originators of emery aggregate flooring
60 East 42nd St. • New York 17, N. Y. * TM
Producers of
EMERI-CRETE FLOORING* • EMERI-TOPCRETE* • EMERI-BOND*

Circle 742 on Inquiry Card—Page 51

REJECTS and SCRAP due to gas are practically eliminated by . . . Model 400 VACUUM DEGASSING CHAMBER



A compact, easily operated, entirely integrated foundry unit thoroughly degasses both ferrous and non-ferrous molten metals in a few minutes.

Complete package unit — requires no process changes — occupies small floor space — no special foundation — easily moved — requires no special experience or training.

Ruggedly built for foundry service.

This Vacuum Degassing Unit permits profitable operation from the first day. Write for illustrated bulletin.

CENTRIFUGAL CASTING MACHINE CO.
P. O. Box 947 Tulsa 1, Oklahoma

Circle 743 on Inquiry Card—Page 51

SPRAYING SYSTEMS
SPRAY NOZZLES
better in every way

DESIGN—based on advanced research and engineering.
CAPACITIES—the most complete nozzle selection in the field.
TYPES—full cone, hollow cone, flat spray, square spray, straight stream and pneumatic atomizing.
MATERIALS—brass, stainless steel or any other required material.
IDENTIFICATION—all nozzles clearly stamped for easy identification and re-ordering.
PROMPT SERVICE—inventory of over 12,000 TYPES maintained for prompt delivery.
Whatever your need, you will find Spraying Systems products and service of real advantage.
Write for Catalog 24

SPRAYING SYSTEMS CO.
3236 Randolph Street • Bellwood, Illinois
ADVANCED SPRAY NOZZLE DESIGN FOR NEW DIMENSIONS IN CONTROL AND PERFORMANCE

Circle 744 on Inquiry Card—Page 51

No. 4 DAYTON RING VALVE BENCH
RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

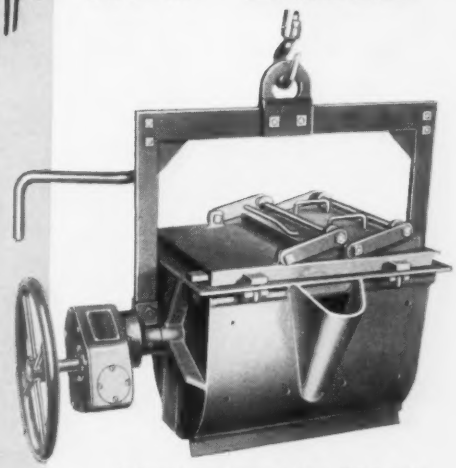
DAYTON PNEUMATIC TOOL CO.
Manufacturers of Pneumatic Tools Since 1903
DAYTON, OHIO

Circle 745 on Inquiry Card—Page 51

NOW ...to increase Foundry **AUTOMATION**

Precise Control . . . Pouring Accuracy . . . Operating Ease for Faster, More Efficient Production

Industrial Equipment's Type 600-B LADLE



Industrial Equipment's Type 600-B Ladle has been proved by severe service in highly automated foundry operations. Foundrymen have found that its extreme ease of operation, precise control and exceptional pouring accuracy even after prolonged use mean higher production, lower labor costs and fewer rejects. Especially developed for small sprue spot pouring, the Type 600-B Ladle permits fast, accurate, economical operation.

The Type 600-B Ladle is just one of many standard ladles manufactured by Industrial Equipment Co.—since 1900 the designer and builder of constantly improved pouring and handling equipment for foundries. Other Industrial products are bowls . . . shanks . . . bails . . . and tongs. In addition to its standard types, Industrial Equipment Co. specializes in developing custom foundry equipment for special applications.

Write today for the complete catalog which gives details of all the many types of Industrial Equipment products for greater foundry efficiency.

Industrial EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

Circle 746 on Inquiry Card—Page 51

Rips The "Skin" Off The Toughest Finish

FAST!

BLAST GRIT

BLACK BEAUTY

- No silicosis health hazard—safe, clean
- Faster cutting, sharpest material known
- Longer lasting, reusable many times over
- Moisture-free, no packing due to dampness
- Leaves surfaces absolutely clean—no deposits
- Gives highest degree of etch—better bonding

WRITE TODAY for technical brochure covering this NEW low-cost product in full. Six grades available for any degree of etch—specify need

Free Working Sample

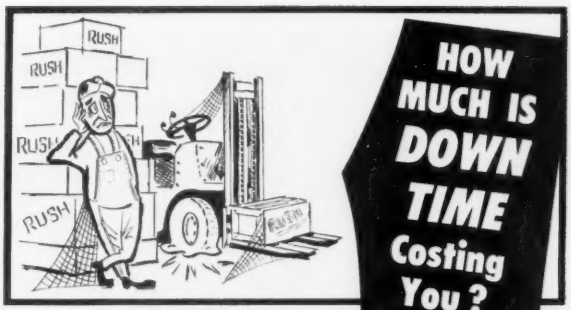
(shipped to you at no cost)

Manufactured and Distributed by

H. B. REED & CO., INC.
6618-N Kennedy Ave., Hammond, Ind.

H. B. REED CORP.
91-N Passaic St., Passaic, N. J.

Circle 747 on Inquiry Card—Page 51



HOW MUCH IS DOWN TIME Costing You?

SWITCH TO

MITCO INDUSTRIALS!

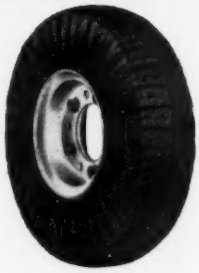
NO FLATS, NO PUNCTURES
NO BLOWOUTS

The premium quality laminated tire. NOW offered as standard or optional equipment by 36 original equipment manufacturers !

Resilient, easy steering Mitco Industrial Tires. **Rugged Performance.** Thrive on hazardous operations and have unequaled carrying capacity.

Extra Traction with gripping tread. **Longer Life**—often 4 times as long.

For Pay Loaders, Fork Trucks, Tractors, Yard Cranes and other Industrial and Agricultural Equipment.



Savings on Tire Expense Guaranteed

Write or wire for name of nearest distributor.

MITCO INDUSTRIAL TIRES

MITCHELL INDUSTRIAL TIRE CO., INC.
Chattanooga, Tennessee
P. O. Box 468 Phone TAylor 1-7531

Circle 748 on Inquiry Card—Page 51

Plane smooth, exact patterns with this 24-in. OLIVER

Compact . . . easy to adjust and operate . . . saves valuable time!

This Oliver Surfacer is popular in leading pattern shops. Takes stock up to 24″ wide, 8″ thick. It feeds stock at any rate from 18′ to 40′ a minute at the turn of a dial. Controls are centrally located for operator's convenience. Has built-in jointing and grinding rigs. Precision built to insure perfect and permanent alignment of parts. Write for Bulletin No. 299.

Oliver also makes 18″, 30″, 36″ Surfacers, and a complete line of woodworking machines for pattern shops

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 4, MICH.

Circle 749 on Inquiry Card—Page 51

OFF THE SHELF SERVICE

AIRMATIC valves

Flow Control Valves

Your best source for air-hydraulic control valves. Save time . . . Save money on immediate delivery. Airmatic Valves are simple in design—compact. Yet they are extremely efficient in performance and adaptability . . . Afford best arrangements for machine tool application. A complete line of 2-way, 3-way, and 4-way valves available for either high-pressure or low-pressure installations.

Write today for complete details about Airmatic Products

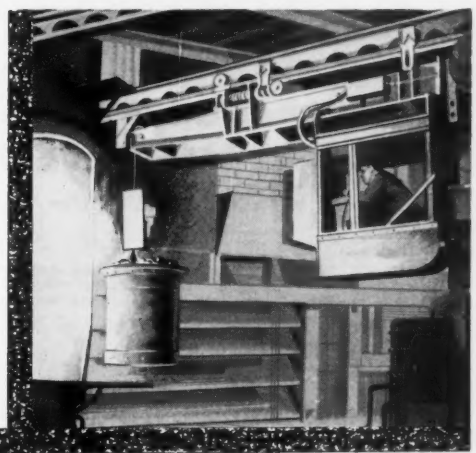
Sequence Valves | Pressure Regulators | Cylinders | Solenoid Valves

Attractive O. E. M. and Quantity Discounts

Delivery from Stock —Immediate

AIRMATIC VALVE INC.
7317 Associate Ave. Cleveland 9, Ohio

Circle 750 on Inquiry Card—Page 51



FOUNDRY INSTALLATIONS

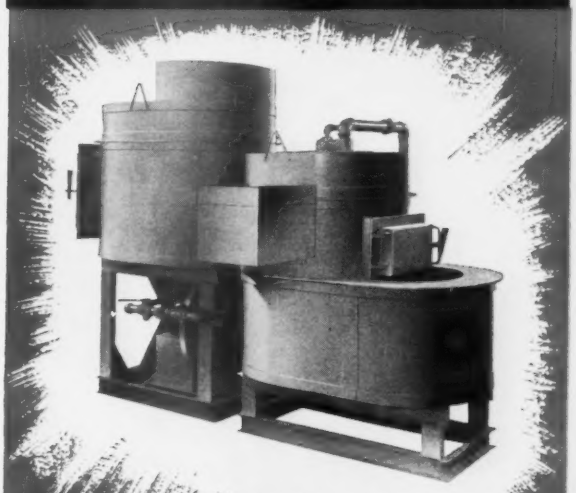
Commercial Contracting Corporation has installed or modernized foundries for all the major automotive producers. Utilize this experience to up-date your own foundry facilities.

Write for information

COMMERCIAL CONTRACTING CORPORATION
GENERAL CONTRACTORS
12160 CLOVERDALE • DETROIT 4, MICHIGAN

Circle 751 on Inquiry Card—Page 51

HERE'S ANOTHER NEW ONE!



Stroman "DC" Cylinder Type Furnaces for Combination Melting and Holding Aluminum with CONTAINED COMBUSTION BURNERS

For Die Casting, Permanent Mold and Sand Casting Operations

"Versatility Plus" is the keynote of these newest Stroman Contained Combustion Furnaces. They are absolutely new in design for they incorporate Contained Combustion Burners which eliminate direct flame impingement on the metal. They also make for cooler working conditions because of less heat loss. They give greater fuel economy for less BTU input is required . . . Longest refractory life and least maintenance due to mild combustion conditions . . . Uniform heating condition and improved metal temperature control assure lowest metal losses.

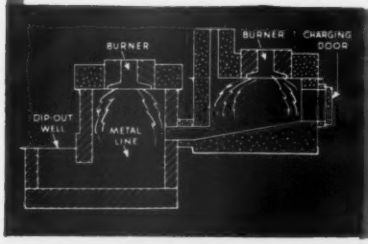
They are easy to charge and readily adaptable to automatic charging. Handling from 450 to 1600 lbs. per hour break down capacity with holding capacity from 600 to 2400 lbs., they will melt metal faster and more economically, and at the same time produce only the highest quality metal.

Roof of the furnaces are easily removed for furnace cleaning, relining, repair or burner service, as burner is mounted in the roof.

These Stroman "DC" Cylinder type furnaces are available in break down and holding combinations. However separate break down and holding units can be purchased. Break down units are often used to augment iron pot, electric and crucible furnace capacities.

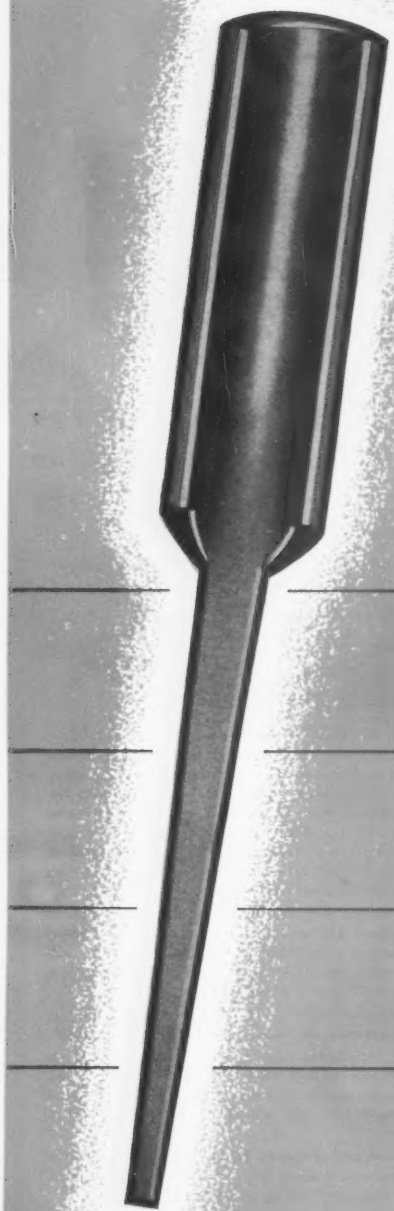
Their flawless operation and ability to deliver years of trouble-free operation stamp them as a leading Stroman Aluminum production furnace. Investigate their cost cutting operation today.

Send for complete new catalogue No. 150 just off the press.



STROMAN
FURNACE & ENGINEERING CO.
FRANKLIN PARK
ILLINOIS

Circle 752 on Inquiry Card—Page 51



FUSET* CHILL NAILS

* ORIGINAL DESIGN

* MASS PLUS SURFACE

* IMMEDIATE CHILLING AND FUSION

* IMPROVES QUALITY

* LOWERS COSTS

*PATENT NOS. 2,751,686, 823,412, 840,053, 1,710,266, 540,888. OTHERS PENDING.

*TRADE MARKS REGISTERED

CANTON CHAPLET AND CHILL
DIVISION
THE W. L. JENKINS CO.
1445 WHIPPLE RD. S. W.
CANTON, OHIO

Superior Performance through Superior Design!

First open channel chill embodying scientific principles of mass plus surface. Patented design provides more chill and fusion area.

Unique combination of two heat-conduction principles permits higher degree of chilling efficiency than ever before obtainable.

Balanced arrangement of maximum surface with correct cross section thickness transfers heat faster and enables finest possible fusion!

Exclusive channel design permits maximum parent metal fill-in around chill — increases casting strength — allows better control of shrinkage and solidification.

Less bulk lowers shipping, coppering, storage, plant handling and labor expenses. Fuset efficiency reduces scrap, welding and finishing costs.

WRITE TODAY FOR PRICES AND SAMPLES

FUSET® CHILL NAILS ARE MADE IN A WIDE RANGE OF SIZES. EXCLUSIVE FEATURES ARE ALSO AVAILABLE IN FUSERT® CHILLS FOR LIGHT OR HEAVY SECTIONS AND FUSPIDER® CHILLS FOR A LARGE VARIETY OF APPLICATIONS.

CLASSIFIED ADVERTISING

Help Wanted

REFRACTORIES
SALES ENGINEERS

ENGINEERS (Ceramic, Chemical, Metallurgical, or Mechanical) with 3-5 years of production or development experience in ferrous or nonferrous metal processing:

Rapidly expanding Refractories Division offers promising opportunities working on the application of new high-temperature refractories.

Location—Worcester, Mass.
Send Resume to Mr. T. S. Green
Assistant Manager of Personnel
NORTON COMPANY
Worcester, Mass.

Refractories • Abrasives • Grinding Machines

INDUSTRIAL ENGINEERS
OR
MECHANICAL ENGINEERS

For positions in the METHODS ENGINEERING DEPARTMENT of a large, gray iron foundry located in Northwest Ohio. Engineering degree or its equivalent required. Experience preferred but not essential.

Excellent Salary
Outstanding Opportunity
Permanent Position

Write stating qualifications or phone:

PERSONNEL DEPARTMENT
DEFIANCE PLANT — CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
DEFIANCE, OHIO
Phone: Defiance 2-2915

COREROOM FOREMAN

Experienced man needed to supervise a five-man department making small and medium cores for aluminum and brass sand castings. Should be experienced in rigging both wood and metal coreboxes for blowing. We have converted much of our work to the CO_2 process and are completely remodeling and re-equipping this department. Good salary and bonus for a capable hardworking man.

BROST PATTERN AND CASTING CO.
2934 EAST 55TH STREET
CLEVELAND 27, OHIO
MI 1-1132

PROCESS ENGINEER

Young man with some foundry experience to join established Eastern steel foundry organization. Principal responsibilities will be to coordinate and follow foundry methods, planning and quality control procedures. Met. E. or Mech. E. degree desirable but not essential. In reply give full experience resume, salary requirements and other pertinent data. All replies held confidential.

BOX 515, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALES SERVICE ENGINEER

Wanted by progressive producer of foundry supplies. This is a real opportunity for young foundry engineer with experience in sand and/or melting practices. College education is desirable. Ability to learn and develop is essential. Send complete record. Address: Box 508, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN—NONFERROUS

To take charge of a modern foundry producing ornamental, architectural and tablet castings in bronze and aluminum. Able to work along with and direct molders. Good opportunity for right party. State age, experience and salary desired in confidence. Address: Box 510, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

PATTERN SUPERVISOR

For key job with modern production foundry. Must be journeyman wood patternmaker, able to take charge of wood, metal, and foundry setup. Experience in automotive foundry work preferred. Must have knowledge of gating, core blowing, rigging, etc. Age 30 to 50. Exceptional opportunity for right man. Apply giving particulars, including age, experience, references, how soon available and salary expected.

BOX 482, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

OVERSEAS OPPORTUNITY

Minimum of Eighteen Months Service

Melters, molders, coremakers, men with general foundry training to staff new operation in South America. Experience with automotive and malleable castings desirable. Send complete information, including salary requirements and recent photo.

BOX 521, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL FOUNDRYMAN

Capable of improving operations and quality of castings produced.
Unusual opportunity for an ambitious man with good supervisory ability, if he can qualify.
We operate an electric steel foundry, about 350 ton capacity, located in central Ohio.
Give particulars of age, education, family status, and if available, late picture in first letter.
All correspondence will be confidential and qualified men will be interviewed.
If interested, write:

BOX 532, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL FOUNDRY METALLURGIST

Leading steel foundry located in the Middle West with 500 ton capacity, has opening for a qualified metallurgist.
Must be a technical man of proven ability, and able to direct Metallurgical Department.
Submit data covering experience, education, age, references and salary range, etc. All replies confidential.

BOX 529, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY ENGINEERS

Several engineers wanted. Must be thoroughly acquainted with cost work and work measurement standards based on time study. Free to travel. Address: Box 590, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY FOREMAN

Excellent opportunity for qualified man in one of the worlds largest nonferrous foundries. Must have supervising ability with a minimum of 5 years' squeeze molding machine experience on brass and bronze. This is a pleasant, permanent, well paying position with all benefits. Location, mid-west. Reply in detail and full confidence.

BOX 516, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PATTERN DRAFTSMEN

Experienced in the design of pattern equipment, core boxes, qualifying fixtures, and gauges.

Excellent Salary

Permanent Position

Unlimited opportunities with a large, gray iron foundry in Northwestern Ohio.
Write stating qualifications or phone:

PERSONNEL DEPARTMENT
DEFIANCE PLANT — CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
DEFIANCE, OHIO
Phone: Defiance 2-2915

DEVELOPMENT METALLURGISTS

For technical development of ferro-alloys, master alloys and special metals which are used in the production of:

(1) Carbon steels and low alloy steels (Open hearth and electric.)
(2) Stainless steels, tool steels and high temperature alloys.
(3) Cast iron, ductile iron and malleable iron.
(4) Aluminum alloys, copper alloys, titanium metals and other nonferrous fields.

To qualify for any of these positions, applicants should have an engineering degree, five or more years' practical experience in production, processing and metallurgical development, and the ability to carry out constructive field assignments in pilot and production operations. Confidential. Send complete resume, and state salary anticipated to:

MR. H. S. SCHAUFUS
CHIEF METALLURGICAL ENGINEER
VANADIUM CORPORATION OF AMERICA
RESEARCH CENTER
CAMBRIDGE, OHIO

DESIGNERS-DRAFTSMEN-ENGINEERS

Experienced in foundry layouts and equipment. Send experience record, personal data, recent photo and reference prior to personal interview.

BOX 533, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

LAYOUT MAN

For metal pattern shop. Paid vacations and holidays. Steady employment. PROCESS PATTERN & ENGINEERING CO., INC., 1707 N. HARRISON ST., FORT WAYNE, INDIANA.

SUPERINTENDENT

For nonferrous foundry. Excellent opportunity for man with good educational background and sound practical experience. Address: Box 479 FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS
Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Help Wanted

SALES ENGINEER

Large well established manufacturer of foundry supply materials requires a young, aggressive man with some foundry experience for Eastern Pennsylvania territory. Considerable travel required. Send complete resume. All replies confidential.

BOX 543, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN

Journeyman molder needed for foreman in gray iron jobbing foundry in Cleveland area for medium and large floor work. In reply give age, experience, references and include photograph. Address: Box 539, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST WANTED

For New England foundry producing carbon, low alloy and stainless steel castings. Should be metallurgical graduate with technical ability to direct laboratory and melting furnaces. Submit resume, giving experience, education, age and salary expected. Address: Box 525, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY MANAGER
GENERAL SUPERINTENDENT

Foundryman, late thirties, extensive background in good foundries, from metallurgy and foundry engineering through superintendency and management. Seek management position with progressive steel or gray iron organization, preferably one requiring technical improvement or rejuvenation. Presently employed in executive capacity with large company, but wish position of great responsibility. Address: Box 496, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN SHOP SUPERVISOR

26 years' varied job shop experience, automotive, plaster, plastics, 42 years of age. Supervisory experience. Premium rated lead-man. Interested in pattern engineering, new methods and materials. Presently employed. Wish to relocate. Address: Box 514, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PRODUCTION MANAGER

Twenty years' highly successful experience, increase production and reducing cost. Foundry and machine experience. Engineering and cost accounting school. Address: Box 540, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Want to locate with a progressive organization that can use the services of a capable, qualified and experienced foundryman that knows his way around. Address: Box 534, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MECHANIZED GRAY IRON FOUNDRY MANAGER

Englishman, 31 years old, presently employed, seeks situation in U.S. Indentured apprentice, metallurgically trained, graduate National Foundry College. Technical or executive position desired. Address: Box 535, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GENERAL MANAGER

Nonferrous, all phases including metallurgy. Top qualifications, reputation and references. Desire permanent position with good stable concern. Address: Box 531, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

MANAGER

Practical, progressive and technical trained foundryman. Well versed in all departments of ferrous jobbing shops, on castings up to 25 tons. Cost and quality minded. Excellent labor relations. Age 46. Now employed. Address: Box 538, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumbers supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 528, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISERS

PLEASE NOTE!

Our next issue is the special Pre-Convention issue—MAY. Copy for this issue must reach us one week earlier than usual. Deadline is April 5. Thank you for hurrying copy to us and remembering: it pays to advertise in FOUNDRY's classified!

PATTERNSHOP SUPERINTENDENT

Middle 30's, married. Experienced in patternshop supervision, knowledge all phases of pattern work and production foundry practices. Desire to relocate, small community preferred. Address: Box 473, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

BUSINESS ADMINISTRATOR—MANAGER

Foundryman seeks management position with progressive company. Accounting and technical training. Fifteen years' experience all phases of foundry, cost, estimating, buying. Address: Box 533, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Gray iron or nonferrous. Familiar with every phase of the foundry, background of practical and technical experience. Now employed as superintendent. Address: Box 498, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERVISORY POSITION

Well versed in gray iron, jobbing or production, cupola and sand control. Practical and technically trained. Two years M.I.T., 25 years' experience. Last 15 years supervisor's capacity. Married, age 44. Prefer Los Angeles or southwest area. Address: Box 536, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Thorough knowledge of all phases of nonferrous metals. Also in ornamental, architectural and tablet casting. Green, dry or French sand. Age 50. 36 years' experience. Desire to make change. Address: Box 541, FOUNDRY, Penton Building, Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 490, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

SALES MANAGER

Experienced foundry manager with sales background will consider connection with a small to medium size foundry (ferrous or nonferrous) in capacity of sales manager and assistant general manager. Basic service offered to develop and maintain castings market within the interested foundry's capabilities. Will consider only the East coast. Address: Box 519, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATION WANTED

German well established foundry engineering works wants qualified firm for the sale of their molding machines in all states of U.S.A. Send immediately complete information with references, size of enterprise, branch offices, etc. for discussion with competent gentlemen at the beginning and end of May, 1957 in the U.S.A.

BOX 513, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

REPRESENTATIVES WANTED

We are changing our sales policy and are interested in discussing the sales of our melting furnace equipment with representatives in various districts outside of New York and Chicago. We manufacture a complete line of gas and oil non-ferrous melting furnaces in all sizes and types.
Also interested in a salesman for our home office.

STROMAN FURNACE AND ENGINEERING COMPANY
9900 FRANKLIN AVENUE
FRANKLIN PARK, ILLINOIS

REPRESENTATIVES WANTED

We seek contact with manufacturers' representatives in New York area who can generate inquiries for steel castings and forgings, nonferrous castings, die castings and die blocks.

BOX 522, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MANUFACTURERS' AGENTS WANTED

To handle well-established repeat supply item sold to pressure die casters. Leader in its field. Splendid earnings opportunity with a product that is a "household name" in the die casting industry. Give full details concerning lines handled. We are especially interested in frequency of contact you now have with pressure die casters. Address: Box 511, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVES

Large nonferrous sand and permanent mold foundry interested in commission salesmen in Illinois, Indiana, Missouri and Michigan. Replies confidentially treated. Personal interviews upon request. Write resume of experience. Address: Box 509, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVES WANTED

Old line supplier to foundry industry is desirous of representation in Chicago, Cleveland, Detroit, Milwaukee, Indianapolis areas for sales of refractory cements. We are leaders in this field. Address: KEYSTONE REFRACTORIES CO., 120 LIBERTY STREET, NEW YORK, NEW YORK.

CLASSIFIED ADVERTISING

Open Capacity

OPEN CAPACITY

We have open capacity on Squeezer, Cope and Drag, and Crane Molding. We also have open capacity in our machine shop on Radial and Multiple Spindle Drill Presses. Address: THE TREATY COMPANY, GREENVILLE, OHIO, PHONE: LIncoln 8-2185.

OPEN CAPACITY

We have open capacity and solicit your inquiries for gray iron castings, ranging in weight from 500 pounds to 15,000 pounds. Quality castings produced under close metallurgical control. Address, Box 537, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

C. W. AMMEN
8651 GREENLEAF AVE.
BUENA PARK, CALIF.

Invites inquiries from anyone U.S. or foreign as to his specially developed tapespondence consulting service in all phases of the nonferrous foundry operations.

Account Wanted

ACCOUNT WANTED

Detroit area automotive foundry trade, excellent contacts for machinery sales or special engineering talent. If background, experience and prestige are necessary for your products, it will pay handsomely to investigate this ad. Address: Box 518, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Osborn #720PJ Jolt Squeezer Strip
or #721PJ Jolt Squeezer Strip.

BOX 512, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Melting furnaces, tilting type, gas and oil fired; Mullers: Simpson, Beardsley & Piper, Clearfield, all sizes. Prompt reply appreciated. Address: Box 527, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED TO BUY

Electric melting furnace, 2000 to 3000 lb. iron capacity. Direct arc with transformers and control equipment. Address: Box 542, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

Brass and aluminum foundry in Central Indiana. Well equipped, capable of pouring three ton of metal per day. Can be financed. Address: Box 517, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOR SALE

Brass foundry, well equipped, for sale or lease. Competition—one non-captive foundry. Address: S. J. STEWART, 527 ST. JOSEPH ST., NEW ORLEANS 12, LA.

For Sale

FOR SALE

1—Porbeck Gas Fired Core Oven, size 16-3B, complete with Safety Controls.
1—Tabor Rollover Machine, 22" x 30".
1—Tabor Portable Jar Pin Strip Machine, 32" x 32" table, 10" draw.
1—SPO Jolt Squeeze Pin Strip Machine, Portable Model #2136G.
1—SPO Jolt Squeeze Machine, Model 110-J.
1—1000# Whiting Geared Easy Pour Ladle.
2—Redford Cartridge Core Blowers.
All equipment in good operating condition. Write or phone:

COLUMBIANA PUMP COMPANY
EAST RAILROAD STREET
COLUMBIANA, OHIO
PHONE: IVANHOE 2-3383

SUTTER SHELL MOLD MACHINE

Fully automatic 20" x 30" mold—push button controls. Equipped with gas oven heat and either electric or gas pattern heat, with additional gas compressor. Need room and will sacrifice at any reasonable offer. Subject to prior sale.

KENCROFT MALLEABLE CO., INC.
BUFFALO 7, NEW YORK

CLASSIFIED ADVERTISERS

PLEASE NOTE!

Our next issue is the special Pre-Convention issue—MAY. Copy for this issue must reach us one week earlier than usual. Deadline is April 5. Thank you for hurrying copy to us and remembering: it pays to advertise in FOUNDRY's classified!

SURPLUS EQUIPMENT
INQUIRIES INVITED

1—International RES Jolt Squeeze Rollover Draw, 14 x 7½
2—#96 Monarch Rev. Aluminum Melting Furnaces, Oil Fired
4—#450 Fisher Type Stationary Furnaces, Oil Fired—7½ H.P. Spencer Blower
4—#450 Fisher Type Stationary Furnaces, Oil Fired—5 H.P. Blower
3—International LJS—10" Squeezers

ADVANCE ALUMINUM CASTINGS CORP.
CHICAGO, ILLINOIS
VIRGINIA 7-1900 MR. ALLEN

BLOWERS FOR SALE

Spencer—No. Amer.—Stroman
Capacities from 60 to 4500 CFM at 2, 12, 16 and 24 ounces.
Motors for 110/60, 220/440/3/25 and 60 cycle and 230 volt DC.
Let us quote on your requirements!

R. C. CHELIUS
31 PALMER AVE.
KENMORE, BUFFALO 17, N. Y.

FOR SALE

American Model "M" Sand Cutter, type 79/60, serial No. 105. Address: THE PARKER-STREET CASTINGS COMPANY, CLEVELAND 25, OHIO, PHONE: MI 1-5350.

For Sale

GUARANTEED MACHINES AT LOWEST PRICES

MOLDING MACHINES
213 SPO; 4½" jolt; 13" squeeze
2114 SPO—11" sq.
2136 SPO—13" sq.
720 U Osborn—11" sq.
International PKL—14 x 5½"
Tabor—30" x 40"; 12" draw; shockless—1000#
2047 Osborn—18" x 24"; stationary
601—602—605 Osborns
Milwaukee Jolt Squeezers; 16 x 20; 4½" jolt
275 J Osborn Squeezers
113 J SPO Squeezers
CORE BLOWERS
Redford—Bench type
#193 Osborn—for medium cores
#94 Osborn—for large cores
FURNACES
2000 lb. Stroman—Tilting Hydraulic
2000 lb. Fisher—Aluminum
350 lb. Detroit Rocker Barrel
CORE OVENS
Dielectric—Model 900A and 1800A
MISCELLANEOUS
Fork Lift Trucks—2000# to 15000# cap.
U.S. 7½ HP 3 speed grinders; 28" wheel
Model S Screenerators—B & P
Climax Wire Straightener
Model AA American Sandcutter
Jib Cranes—2 ton cap.
Electric Hoists—2 ton cap.
#42 Osborn Hand Rollovers
FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

URGENTLY NEEDED

Small Wheelabrators or Pangborn TumBlast, or Table Blast. Will pay cash or will give tremendous trade-in value on any of the Sand Blast Equipment listed below:

Pangborn E.S. 347 Conveyor Cabinet, 4 throwing wheels, used for blasting motor blocks, a beauty, can be seen in operation. $9,000 FOB Det.

Pangborn 14 GK Rocker Barrel	2,500.00
9' LG-14 Pangborn Table	4,500.00
6' LG-14 Pangborn Table	3,000.00
6' LE Pangborn Air Table	800.00
48 x 48 Wheelabrator TumBlast	5,000.00
42 x 48 Wheelabrator TumBlast	3,000.00
36 x 42 Wheelabrator TumBlast	2,500.00
27 x 36 Wheelabrator TumBlast Rubber or Steel Belt	3,000.00
15" Continuous Wheelabrator TumBlast	2,000.00
8' Wheelabrator Table Blast	2,000.00
6' Wheelabrator Table Blast	3,000.00
4' Wheelabrator Table Blast	2,700.00

Vapor Blast Cabinets, singles and doubles.
All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. JEFFERSON
DETROIT 9, MICHIGAN
VI-36750
We Will Buy One Piece Or Your Entire Plant

FOR SALE

ALLIS CHALMERS FOUNDRAMATIC SHAKEOUT, 48" x 60" deck, with ⅝" perforations. In good condition. Just recently over-hauled.

NEW ENGLAND MALLEABLE IRON COMPANY
LINCOLN PARK, RHODE ISLAND
REGENT 7-7502

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS

Unused — Rebuilt
WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 3-6783
P.O. Box 51—Rochester 1, New York

MOLDING MACHINE

Herman 6000# capacity, jolt-roll-draw in operating condition. Asking $2900 f.o.b. Address: POTTSTOWN MACHINE CO., POTTSTOWN, PA. (Phone 37, H. H. Houston).

CLASSIFIED ADVERTISING

For Sale

FOR SALE

MOLDING MACHINES
1—Tabor 22" Power Jolt, Rollover, Draw, Portable, 22" x 32" Table.
1—Milwaukee jolt-squeeze stationary.
2—International Jolt, Rollover Draw, 24" x 10G, Stationary.
2—No. 275 Osborn jolt squeezers. Stationary
2—SPO jolt Squeeze strip—13".
BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 6000 CFM.
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots Rotary Blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—2 HP 20 oz. Spencer Turbine Blowers.
1—Spencer Turbine Blower, 5400 CFM, 18 oz. 40 HP.
1—Spencer Turbine Blower, 2700 CFM, 27 oz., 30 HP, 3/60/220-440-V.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld tilting crucible, gas fired, 500# brass.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas 250# A1, Cap.
1—Hausfeld 2000# aluminum capacity furnace barrel type, open flame, oil fired.
1—#2 U.S. rotary melting furnace, 500# brass.
MISCELLANEOUS
1—Hydro-Blast barrel with 25 HP pump.
3—Jib cranes. 16' swinging beam, 2000# cap.
1—Ready Sandy, Portable, Complete.
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 1½ HP.
1—Stoney crane type shakeout.
1—Combs Riddle.
1—NDP Royer sand separator.
1—#16 Roto-clone unit complete.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

—FOR SALE—

- MOTIVE SPEED SLINGER Excellent Condition
- HYDRO BLAST
- 25 TON A. C. CRANE
- 25 TON D. C. CRANE
- COMPLETE MACHINERY & FLASKS FROM OUR HEAVY FOUNDRY

"We need the space for other purposes"

ERIE ENGINE & MFG. CO.
12th & EAST AVE. ERIE, PA.

AIR TOOLS—UNUSED & REBUILT
SAVE OVER 50%
UNCONDITIONAL GUARANTEE

REBUILT VERTICAL GRINDERS
Ing. Rand #4F, 4500 rpm. list $280. SPECIAL $125.00

REBUILT BENCH RAMMERS
Ing Rand #14, list $190.00, SPECIAL $80.00

(UNUSED) CHIPPING HAMMERS
Master #1 .....list $130. SPECIAL $ 65.00
Ing. Rand #3 ....list $130. SPECIAL $ 70.00
Cleco #3 .....list $130. SPECIAL $ 65.00

REBUILT AIR HOISTS
Ing. Rand Mdl. LC5, 500 lbs., List $340., SPECIAL $175.00
Keller Mdl. 86-IV10, 1000 lbs., List $340., SPECIAL $195.00
Aro Mdl. 7700, 1000 lbs., list $340., SPECIAL $195.00
Ing. Rand Mdl. B, 1000 lbs., list $540., SPECIAL $245.00
Keller Mdl. 86-2V20, 2000 lbs., list $540., SPECIAL $325.00

SEND FOR COMPLETE AIR TOOL CATALOG!
U.S. INDUSTRIAL TOOL & SUPPLY CO.
8960 GREENFIELD, DETROIT 28, MICHIGAN
PHONE: BROADWAY 3-8318

EQUIPMENT FOR SALE
Cupola Blowers—Perfect Condition

1—Spencer Turbine 50 HP, 4800 CFM, 24 oz.
1—Spencer Turbine 100 HP, 9800 CFM, 24 oz.
220-440-3-60 complete with starters.

APEX FOUNDRY, INC.
633 LYCASTE
DETROIT 14, MICHIGAN
VALLEY 1-3260

FOR SALE

Lectromelt 250 lb. type "U" side charge electric furnace. Complete, good condition.

BEAVER VALLEY ALLOY FOUNDRY CO.
MONACA, PENNSYLVANIA

FOR SALE

14 Osborn 275 PJ Jolt Squeezers, excellent condition, recently taken from service. $175.00 each. Address: Box 526, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

LARGE STEEL FLASKS

Specially priced for immediate removal—
Edwardsville, Illinois

Quantity 43, 27½" x 48" x 8½" high
Quantity 38, 39¼" x 53½" x 9" high
Quantity 16, 54¼" x 64¼" x 9" high
Quantity 146, 34¾" x 61½" x 9" high
Quantity 10, 40" x 53" x 8¾" high
Quantity 4, 39¾" x 62" x 8½" high

CALL, WIRE OR WRITE
ACME EQUIPMENT COMPANY, INC.
126 SOUTH CLINTON STREET
PHONE: ANDOVER 3-3430
CHICAGO 6, ILLINOIS

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

We try to keep on hand a stock of **"Hard Chrome Rebuilt Foundry Tools"** such as Rammers, Chipping Hammers and Core Breakers.

Our prices are about **One-Half** the cost of new tools. All tools sold by us are guaranteed and can be returned if not found satisfactory.

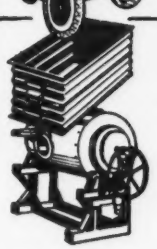
CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FOR SALE

4—Good used Chicago Pneumatic hand air grinders, cup wheel, two handle type. All in excellent condition. $100.00 each. Address: **V. S. VEENMAN INDUSTRIAL CASTING, 938 BROAD BLVD., CUYAHOGA FALLS, OHIO.**

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD CLEVELAND 10, OHIO



OSBORN ROLLOVERS:
5—405 rollovers and pattern draw 18 to 26" draw, air clamps, 3500 lbs. capacity.

TUMBLING MILLS:
1—60" x 72" Ransohoff tumbling type wet cleaning mill, Serial No. 6318, drive 15 HP, bucket loader 5 HP 3/60/220

1—30" x 54" Royersford
1—36" x 54" Royersford

MAGNESIUM CLEANING CABINETS:
6—Whirlpool Duplex, 800 CFM, 100" wide x 65" deep x 90" high. Buffalo exhausters—7½ HP., 220/440

ASK FOR OUR COMPLETE LISTING!!

GUARANTEED USED FOUNDRY EQUIPMENT

GLENVILLE 1-1222

For Sale

FOR SALE

1—Simpson Mixer, #2, 20 HP motor.
Miscellaneous: Screens, Pulverizers, Grinders.
Tyler Rotap Screens etc.
Wanted: Your Idle Machinery.

OUR 40th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
OL 9-4425 N. Y. TEL. BA. 7-0600

FOR SALE

Royer NB 2 Sand Separator and Blender, 7 to 10 tons per hour, rubber tired. Climax #2 core wire straightener, Milwaukee 3036D Plain Jolt Table. Many other items. Send for our bulletin #39.

SOMIL EQUIPMENT & SUPPLY COMPANY
SOUTH MILWAUKEE, WISCONSIN
PHONE SO 2-3880

FOR SALE

Four Osborn Model 2047-3 Rollover jolt molding machines, Serial #10867-BN. Core box 21¼ x 22¼, flask space 11⅛", pattern draw 8". Never used.

TRIPLEX MACHINE TOOL CORP.
75 WEST STREET
NEW YORK 6, NEW YORK

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

For Sale

CLASSIFIED ADVERTISERS

PLEASE NOTE!

Our next issue is the special Pre-Convention Issue—MAY. Copy for this issue must reach us one week earlier than usual. Deadline is April 5. Thank you for hurrying copy to us and remembering: it pays to advertise in FOUNDRY's classified!

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
340	20oz.	A-B	6000	32oz.	Ing.-Rand
320	12oz.	Spencer	4700	32oz.	Ing.-Rand
9000	6"SP	Northern	2500	7oz.	Sturt.
3420	8"SP	N.Y.	1300	16oz.	Spencer
2700	⅝"SP	Ilg	800	13oz.	Buffalo
2500	½"SP	American	400	12oz.	Buffalo
1100	4½"SP	Bayley	450	7oz.	Spencer
2344	2"SP	Clarage	400	16oz.	No.Am.

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

For Sale

FOR SALE

JOHNSTON & JENNINGS 1020 B Jolt Rollover with hydraulic head, excellent condition.
Ingersoll-Rand Air Hoists, one and 2 ton never used. Still in original crates.
American Tumblast 15 x 20 Rubber lined W/DC
Herman Jolt Stripper 48 x 54
Royer Portable Screenarators
Gyratory Riddles
1—Nichols Plain Molding Machine, High Speed.
3—U.S. Variables speed Grinders. Double end, 7½ H.P.
1—Standard Variable speed Grinder, Double end, 7½ H.P.
1—Barrett Cupola, 20" x 10' with air operated skip hoist.
2—Whiting Hydro-Blast Barrels with pumps.
1—Skip Hoist for 36 x 42 Tumblast Machine.
1—Davenport #28 8A Jolt Rollover, Pattern draw.
1—27 x 40 Table with Air Clamps.
2—International Rollovers, Portable.
6—Arcade Model 100S Jolt Squeezers, Stationary.
2—Champion Model JS 10-S Jolt Squeezers, Stationary.
1—International Plain Jolt 36 x 48.
1—International Core Blower SB 13.
3—Milwaukee Squeezers, Stationary.
2—International Squeezers, Portable.
1—Whiting Tumbling Barrel 36 x 72 motorized.
1—Demmler #1 Core Blower.
1—Demmler #2 Core Blower.
1—International SB 11 Core Blower.
1—Ready Sand Unit.
2—Tabor rollover, power, 30 x 40, 12" draw.
3—Snag Grinders AC & DC.
3—Pouring Ladles, geared, 2000 lb. Cap.
Cupola Blowers, all sizes.
Aluminum Core Plates, 16 x 22, 16 x 20, 18 x 24.
Steel Flasks 13 x 22 to 26 x 31.
Wilson Hardness Testers.
Steel Corrugated collapsible stacking boxes, 35 x 50 x 25 deep.
Magnesium and steel Buckets for elevators
Belting, all sizes.
Air Hammers, Grinders and Chippers.

MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE
HOMAN MACHINERY COMPANY
710 E. FRONT ST.
CINCINNATI, OHIO
MAin 1-0339

CLASSIFIED ADVERTISING RATES

(Effective July 1, 1956)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted"—"For Sale"—"Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
10 inches (1 col.)	168.00	156.00	144.00	138.00	132.00
15 inches (½ page)	243.00	225.00	207.00	198.00	189.00
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page)	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

THE ACME BARGAIN PAGE

BLOWERS
Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.
1—Whiting-Allis Chalmers Turbo. 5750 CFM 28 oz. 60 HP 440V air pressure Controls.

CONVEYORS, VIBRATING
36″ x 162′ Oscillating Pan Link Belt
30″ x 53′ Oscillating Pan Link Belt

CORE BLOWERS
3—International SB 12.
4—International SB 13.
6—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
2—CB 10 Late Type.
1—3E Demmler Drop Away Draw.
1—No. 4 Demmler.
1—Redford Bench Type.

CORE GRINDERS
3—Milwaukee 70-9.

CORE OVENS
Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.
2—Thermonic 900A-1800A.

CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PASTE OVENS
2—Coleman Gas Fired 28′-25″ x 42″ opening.

DUST COLLECTORS
Rotoclone 24W, 30 HP.

ELECTRIC MELTING FURNACES
Detroit Electric 1500#—Kuhlman 13200 volt transformer complete with controls.
Detroit Electric 350#—Kuhlman 13200 volt transformer and controls.
Detroit 350#-750# shells 2300V Primary, Complete with controls.

FURNACE TRANSFORMERS
We have Electric Furnace Transformers in stock from 800 KVA to 2500 KVA. Write us your needs.

FURNACES, ALUMINUM-BRASS
Stroman 1000# hydraulic Tilt-oil.
Stroman 300-400# hand tilt oil-gas.
Eclipse 100# RB stationary gas.
Stroman 350#.
Fisher 1000# BBI Manual Nose Pour.
Lindberg 500# ASM 600.

GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20″ dia. wheels. 10 HP 220/440 v motors, variable speed drives.
1—3″ x 24″ U.S. #65, 20 HP 220/440V.
1—7½ HP Hammond D. E. Snag Grinder.

GRINDERS, SWING FRAME
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″x24″x12″ U.S. 15 HP.

HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

LADLES
2000# Whiting Jr. & Car.
5000# Modern Geared.

MOLDING MACHINES
Jolt Squeezers:
2—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″. x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine, 18″ x 21″ table.
1—Osborn 275J.
1—Taccone Model TD4, high production diaphragm molding machine.
Jolt Squeeze Pin Lifts
6—712 PJ Osborn, 18″ x 28″ table.

ROLLOVERS
1—Herman 4000# Series 30″ x 60″ table.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
3—Spo Model 9032.
1—Milwaukee 217, 22″ x 42″ table.
2—International Type G, Portable, 20″ x 8″ draw.
3—Tabor Portable Rollover 30″.
Johnston & Jennings 1020-44 x 44 max. Flask Size.
Osborn #405 20″ x 60″ table.

PIN LIFT PUSHOFFS
1—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.
2—Milwaukee 620 ND-20″ x 24″ table.

MULLERS
Simpson #2 Unit drive
#70 B & P modern cross head, rebuilt.

OVERHEAD TROLLEY CONVEYORS
5000′ Jervis B. Webb & Link Belt 678 chain, 4 D.C. motor drive and MG set.

POURING DEVICES
3—Pouring devices, Whiting 500#.

SAND CONVEYORS
144′-30″ Flat with Drives.
47′-30″ Trough with Drives.

SHAKEOUTS
Link Belt 5′ x 10′—7½ HP motor

TUMBLING BARRELS
3—Royersford 42′ x 72′ Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x 64.
1—Sly 42″ Dia. x 56″.

WIRE STRAIGHTENERS
Climax 2A

WHEELABRATORS
48″ x 42″ American, bucket loader

SPACE HEATERS 6—2,000,000 BTU/hour Model H.D. 2000 Lee oil fired individual space heaters, w/all controls, 15 HP 3/60/220-440V blower motors. Used one season.

ACME

ACME EQUIPMENT CO., INC.
We will buy for cash a single piece of equipment or your entire plant
126 South Clinton Street • *Phone:* ANdover 3-3430 • Chicago 6, Illinois

MONA

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS
COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS
25—CENTRIFUGAL, 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure and Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—AMERICAN WHEELABRATOR TUMBLAST, 48" x 48" w/loader used 9 Mos.
1—AMERICAN WHEELABRATOR TUMBLAST, 42" x 48" w/loader
1—AMERICAN WHEELABRATOR TUMBLAST, 27" x 36" w/loader
1—15" Continuous AMERICAN TUMBLAST, 4 tons per hour capacity
1—AMERICAN WHEELABRATOR, 36", Continuous Side Discharge, Two Head, Serial #A95643, New 1953, Used 2 Months
1—PANGBORN TABLAST, 8' Table
1—PANGBORN BLAST CABINET, #EP-5
3—TANNEWITZ METAL CUTTING BANDSAWS, 30" and 36"
2—CRESCENT METAL CUTTING BANDSAWS, 30" and 38"
4—BURRING BENCHES, Magnesium cleaning, 9' L x 30" H x 30" W
1—AMERICAN #1 MULTITABLE TABLAST, 17" Table
10—WHITING 36" x 36" x 72" w/gear head motors & brakes
1—WHITING 36" x 72" Round w/gear head motors & brakes
1—WHITING 24" x 72" Round w/gear head motors & brakes

CONVEYORS
1—LINK BELT, vibrating, double deck, 80' x 24", w/exhaust hood
1—LINK BELT, Car type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK BELT, 30" Steel Apron Conveyors, 100' Centers
1—JEFFREY, 3 compartment, ingot mold
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS
1—CHAMPION CB-12
3—INTERNATIONAL SB-13
1—OSBORN Core Rollover, #136-3, (NEVER USED)
11—DEMMLER #1, #2, #2A, #2K, #3K, #55
5—OSBORN #92, #192, #193, #9B1, #91-10

CUPOLAS
1—MORRIS #9, Skip charger, Blower, Mixing Ladle, Never Installed
1—SKIP CHARGER for #9 Cupola with scale and buckets
2—TABOR Cupolettes, 48" dia, 9" cap.
1—WHITING Skip Charger for #5 Cupola

DUST COLLECTORS
9—ROTOCLONE #12 Type N, #14D, #16W, #20D, Type W 30"

FLASKS
150 HINES AND FREEMAN ALUMINUM, Popoffs and Jackets
200 TRANSITE CORE PLATES, Various Sizes
SEND US YOUR REQUIREMENTS

FURNACES—DIRECT ARC MELTING
1—3,000#/hr. LECTROMELT
1—250 Lb. LECTROMELT, Side Charge
1—500 Lb. LECTROMELT, Side Charge
1—6 Ton HEROULT

FURNACES—INDIRECT ARC
1—350#/hr. DETROIT, Complete
1—1500# DETROIT ROCKER, Complete
1—3000# DETROIT ROCKER, Complete

FURNACES—INDUCTION MELTING
1—20 KW, AJAX SPARK GAP, High Frequency
1—3 KW, AJAX, Lab type

A TERRIFIC BUY!

PANGBORN CONTINUOUS SHOT BLAST MACHINE

REPLACEMENT COST OVER $75,000.

5 Wheel Type each wheel driven by 20 Hp AC Motor. Pendulum type #458 chain conveyor for pick up and return, w/motor driven screw type conveyor for shot return to bucket elevator. Complete w/all controls and switches. Serial #180 RF-3918. Large lot of new spare parts.

CALL US COLLECT TODAY!

FURNACES—GAS & OIL
1—FISHER MNP, Gas, Tilting, 1700# cap. Mag.
2—FISHER, Gas, Stationary, 4 Burner, 500# cap.
1—FISHER MNP, Oil, Tilting, with blower, 500# cap. Alum.
1—FISHER MNP, Oil, with blower, 1500# cap. Brass
1—HAUSFELD, Tilting, 1200# capacity
1—SKLENAR, Oil, 600# Cap.
1—STROMAN, Gas, Tilting, 1,000# cap. Alum, auto control hyd. lift
1—REDA 550#. Never Used

GRINDERS
1—GARDNER 12" x 2½" wheels, 5 HP
1—HISEY WOLF, Model 4, 16" x 2" wheels, 7½ HP
1—MODEL CLASS ONE, 18" x 3" wheel, 15 HP
3—U.S. Model 64, 14" x 2" wheels 5 HP
1—U.S. Model 66, 14" x 3" wheels, 7½ HP
1—U.S. Model 65, 20" x 3" wheels, 10 HP Swing Frame
1—MUMMERT DIXON, 16" x 2" wheel, 7½ HP
4—22" wheels, 10 or 15 HP
1—CINCINNATI, 5 HP, 2/60/110

MOLDING MACHINES
Jolt Rollover Pattern Draw
2—J & J #918, 44 x 54 Table, 20" draw.
2—J & J #815, 30" x 40", 15" draw, 1200# jolt
2—INTERNATIONAL, 13 x 17" table, 6" draw
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 42 x 78"
1—HERMAN 3000#, 30" x 66" Table
2—HERMAN 1500#
1—HERMAN 750#, 30" x 36"
2—OSBORN #602, 36" x 26", 900#
2—OSBORN #405-86, with leveling carriage
1—OSBORN # 405, 3,000#, flask size 64" x 50", 18" draw
3—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
1—TABOR, 30" x 40" w/air clamps, 1000#
3—TABOR 22" x 42", pattern draw, shockless, portable
1—TABOR, 20 x 30" w/air clamps, 1000#
2—TABOR, 14" x 16" Rockover
1—SPO ROCKOVER #506, 24" x 25" table

Bumpers
3—DAVENPORT, Table sizes 24" x 27", 30" x 30"

Jolt Pin Lift
1—J & J #681-C, 30" x 25" table, 600# cap.
2—SPO #305, 20" x 27" table, 750# cap.
1—HERMAN, 22" x 30" table, #4317
1—TABOR, 17" x 20" table, portable
1—TABOR, 20" x 20" table, hand strip
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#

Jolt Squeeze Pin Lift
2—OSBORN #712, 18" x 28" table, 12" Sq.
1—SPO 2136, 21" x 30" table, 13" sq.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#
2—MILWAUKEE #163 15" x 24" table, 11" sq.
1—TABOR, 20" x 24" Table, 600#

Jolt Squeezers
2—MILWAUKEE #104-5JS, 17" x 21", port.
3—SPO #110J, 17" x 20" table, 10" sq.
4—INTERNATIONAL #10 LJS, 17" x 20" table
2—INTERNATIONAL, #12 LJS, 17" x 20" table, stationary and portable
6—TABOR, 3" Jolt, 17 x 20"
1—NICHOLS #12 F-P, portable, 600#
12—OSBORN #275J, #275PJ, 16" x 20" tables, 10" sq., 400#
2—INTERNATIONAL, PKL, 18" x 24" Table, 12" Sq.

MATERIAL HANDLING
1—HYSTER, Fork Lift, Gas, 7500 lb. capacity
1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—MAGNET, 36" Lifting
1—Electric Magnet, 47" x 47", 20" deep

MULLERS AND MIXERS
1—CLEARFIELD, #920, 9' Dia., 25-30 cu. ft.
4—BAKER PERKINS, #4A
3—SIMPSON, #0, 3' Dia. 175 lb. Style M
1—SIMPSON, #1, 4' Dia. 4 cu. ft. batch
1—SIMPSON, #3, 8' Dia. Open Gear, with loader 20-25 cu. ft. batch
1—B & P, #40 SPEEDMULLER, with loader, 4'6" Dia., 5 cu. ft. batch
1—B & P. Conventional, SIMPSON type, 87½" Dia., arranged for cooling

LADLES AND POURING DEVICES
MODERN, SWINDELL, WHITING, TREADWELL—All Types and Sizes—Ready for your Needs!

OVENS
1—COLEMAN, OIL, one compartment, recirc., 60" W x 80" H x 14' 6" L
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½" x 14' x 7'
3—GENRICH, elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22' x 12' x 10'

SAND CONDITIONING
1—ROYER PREPARATOR, Comb. Model RC, 40 Ton/hr. Scrap removal, 9' x 9' hopper
3—ROYER, NB-2, 12" Belt

SAND CUTTERS
1—AMERICAN, 15 HP, 60" Reel, 56" Wheel
1—AMERICAN SANDMASTER, 70" x 104", Rubber tires, Very Late Model

MISCELLANEOUS
1—WHITING #3 PULVERIZER, Brand New, w/10 HP G.E. Motor
1—HANDY - SANDY & REDDY - SANDY UNIT—Excellent Buy!
1—NATIONAL ENGINEERING SAND PREPARATOR Unit w/permanent magnet pulley
1—HOWE WEIGHTOGRAPH SCALE, Model 1700

UNIVERSAL MACHINERY AND EQUIPMENT CO.

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over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—CHICAGO PNEU., 160 CFM, 30 HP.
1—CHICAGO PNEU., Size 7½ x 6, 20 HP.
1—SULLIVAN WN-3, 1220 CFM, 250 HP.

AIR & ELECTRIC HOISTS

85—INGERSOLL RAND Air Hoists, Sizes 4C-5, A, B, C, D, & D6. ¼, ½, 1, 2, & 3 ton cap.
15—DETROIT Air Hoists, 1 & 1½ ton cap.
15—APPLETON Air Hose Reels.
2—P&H and DETROIT Model LHR, 5 ton Electrics.
20—THOR air hoists, ½, 1 & 2 ton cap.

BUCKET ELEVATORS

2—LINK BELT 35 ft. & 50 ft., 12" x 7" Buckets.
2—NATIONAL 45' & 50', 10" x 7" & 14" x 7" Buckets.

CUT-OFF MACHINES

1—DeWALT ME2, 10 HP, 24" Blade.
1—GROB Band Saw, Type OS-36.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLERS Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 192, & 193. From 10 lb. to 75 lb. Cores.
8—REDFORD & MILWAUKEE Bench Type.

CORE OVENS

4—CARL MAYER 2-Compartment, gas fired, I.D. 7' W x 14' deep x 8' H each.
1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—MAEHLER Single Compartment I.D. 96" L x 80" W x 84" H, gas fired.
2—PORBECK Model C-3-C, Double Drawer Type. Gas fired, new in 1955.

CUPOLA BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
2—INGERSOLL RAND FS-367, 8,150 & 9,400 CFM, 50 & 100 HP motors.
1—ROOTS 7,000 CFM, 50 HP motor.
14—LINDBERGS. From 1 HP to 15 HP, 160 to 2100 CFM.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 14, 20, 24, 27, & No. 30. All arranged with sludge ejectors. Capacities up to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—DETROIT ROCKER TYPE AA, 750 to 1500 lbs. capacity with 350 KVA Transformers.
1—AJAX 20 KW Induction Unit.
1—TOCCO 20 KW Induction Unit.
3—AJAX No. 300 & 500 Furnaces Only.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MN P Electric Tilting, Sizes 150, 300, 400, 600, 1700, 2000, & 2400. Aluminum capacities 150 to 2400 lbs. Gas or Oil Fired, With Motors & Blowers.
5—LINDBERG FISHER Type BBI Hand Tilting Furnaces, Sizes 100, 125, 225, & 1000, With Gas or Oil Fired, With Motors & Blowers.
29—LINDBERG FISHER & CAMPBELL HAUSFELD Stationary, Sizes 100, 150, 200, & 550, from 100 to 550 lbs. capacity. Gas or Oil Fired, with motor & blowers.

GRINDERS

Swing Frame

1—MARSCHKE 12" x 2" wheel, 3 HP.
1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.

Snagging

2—U.S. #64, 20" x 3" wheel 7½ HP.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.

Disc

1—BEASLEY #372 Vertical Spindle Dry Grinder, 53" dia., 20 HP, new 1952.
1—QUEEN CITY Model 100 20" x 2" wheel.
1—U.S. #80, 16" x 3" wheel, 7½ HP.

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder, 16" dia. Wheel.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears, Some Mounted on Stands.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs capacity.
37—MODERN & WHITING Lip Pour, Enclosed Gear. 1200, 1600, 2000, 4000, 6000, 7000, 8000, 20,000, 40,000, & 80,000 lbs. capacity ratings.
7—MODERN & WHITING Cylindrical Mixing Ladles. 2 & 3 ton capacities. Electric & Manual Tilting.
7—WHITING Bottom Pour 4 ton.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE & TABOR, Portable & Stationary. 10" Squeeze Cylinder.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.
6—MILWAUKEE 18" Cylinder, 24" x 36" Table.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—HERMAN 6000 lb. Series, 42" x 78".
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Table Sizes 20" x 8", 24" x 10", 30" x 12".
1—INTERNATIONAL RES Size 15" x 8".
2—J & J #612, 24" x 30" Table.
4—J & J #918, 44" x 54" Table.
1—J & J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #217, 35" x 41" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" Draw, 750 lbs. Cap.
1—SPO #413D, 24" x 25" Table, 10" Draw.
1—SPO #506, Portable, 24" x 30" Table.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 32" Table, 10" Draw.

Jolt Pin Lift

2—DAVENPORT 24-AJS, 24" x 30" Table.
2—OSBORN #559, 25" x 30" Table.
1—OSBORN #560, 32" x 45" Table.
1—OSBORN #563, 55" x 63" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—INT. JDP 1600 x 10.

Pin Lift

9—INTERNATIONAL & B & P Speed Draw Machines. Used with Sand Slinger. Capacity from 600 to 2000 lbs., up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #216, 21" Squeeze Cyl.
1—MILWAUKEE #125, 21" x 27" Table.
1—OSBORN #716-PJ, 22" x 34" Table.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
4—INTERNATIONAL PKL, 17" x 26" Table.
1—SPO #2114, 20" x 27" Table.
2—SPO #2136-G, 19" x 26" Table.
1—SPO #2146, 21" x 27" table.

ROTO-LIFT

1—OSBORN 3131, table 22" x 26", 13" squeeze.

MATERIAL HANDLING EQUIPMENT

1—HAYWARD 1 cu. yd. Electric Clamshell Bucket.
1—EC&M 45" dia. Type SA, Magnet.
3—HOUGH Model HA Payloader, hydraulic.
1—BLAW-KNOX ½ yd. Bucket.

CONVEYORS

Steel Apron

9—JEFFREY & LINK BELT 24", 30", 36", 42", & 48" Widths. Length built to your specifications, with reducers & motors to your speed requirements.

Oscillating

3—SIMPLICITY Model OA-10-A, 36" x 15'.
1—LINK BELT 48" x 154', 20 HP Motor.
2—KAYSING IRON WORKS, 24" x 50' x 4" depth.

Roller

2500' MATHEWS 6", 14", 22", 24", & 30" wide. Heavy duty. 2 3/8" dia. roller, 1 1/2" hex shaft on 3" & 4' centers. Mounted above rail on 4" channel iron. Send us your requirements.

Mold

1—LINK BELT 36 cars 4' x 5', 190' track, with automatic dump. New 1952.
3—LINK BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK BELT & JEFFREY 18", 24", & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap. Air gates.
2—NEWAYGO Handy Sandy HS-7-GT.

SAND MULLERS

1—B & P #7 Mulbaro, 700 lb. cap.
1—B & P #30 Speedmullor.
1—B & P #70 Air Cooled.
1—BAKER PERKINS #16½, 30 HP.
1—CLEARFIELD No. 414, 4 cu. ft.
1—DRAVO-DOYLE 6 cu. ft. cap. Port.
1—LINK BELT 48" x 8' Paddle Type.
2—SIMPSON #1 Style B, 400 lb.
3—SIMPSON #3 Style C, 3000 lb.
1—SIMPSON #2 Style C, 1500 lb.
3—SIMPSON #3 Style UD, 3000 lb.
1—SIMPSON #0 Style B, 175 lb.
1—SIMPSON #1½ Style C, 700 lb.
1—SIMPSON #1, style UD, 500 lbs.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER, Models, NDP, C-2, NC-4, NDS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late models.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.

SANDSLINGERS

2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Model DB Stationary Sand Slinger, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late models.
2—B & P Swing Type Slingers 19" head.
1—B & P 2 ton plate feeder.
4—B & P 8 ton plate feeders.

SHAKEOUTS & SCREENS

1—SIMPLICITY 3' x 5' Model B, 5000#.
1—SIMPLICITY 3' x 8' Model BG, 5000#.
1—ROBBINS 8' x 10' Model JF-11 Dual, 16 tons per unit.
1—ROBBINS 3' x 5' portable
1—SIMPLICITY 4' x 10', Model D.
1—SIMPLICITY 6' x 8', Model DE.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, single deck sifter screen, 10 HP motors.

SAND BLAST EQUIPMENT

1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7—14" tables.
2—AMERICAN 36" x 42", w/Skip Hoist.
2—AMERICAN 48" x 42", w/Skip Hoist.
1—PANGBORN 9LF-14—9' dia. Plain Table w/two Roto-Blast units and CH-2 Dust Collector, 4850 CFM. New 1951.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes 30" x 60", 36" x 54", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120". Send for detailed specifications.

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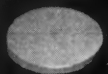
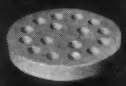
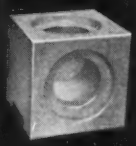
UNIVERSAL refractory gating components



Splash Cores

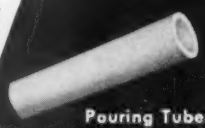


Strainer Cores



Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. UNIVERSAL *refractory* gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call SAndusky 4631

WRITE TODAY FOR CATALOG LISTING SPECIFICATIONS OF STANDARD GATING COMPONENTS



Pouring Tubes

UNIVERSAL CLAY PRODUCTS CO.

1515 EAST FIRST ST. • SANDUSKY, OHIO

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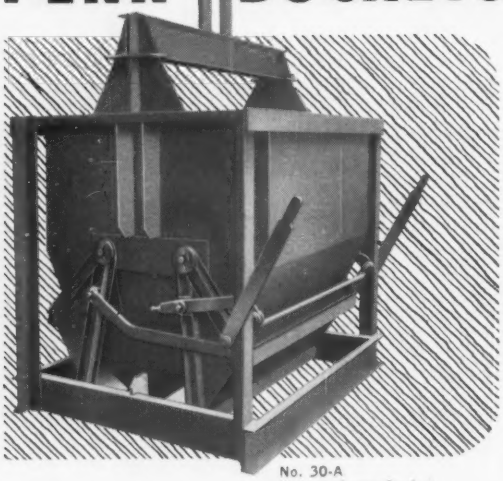
PENN BUCKETS



No. 30-A
Bottom Dump Bucket

Exclusive design makes this bottom dump bucket easy to operate . . . easy to open. Efficient for foundry use in handling all types of sand, moulding or core, dry or prepared. Can be used with coke, scrap iron and castings also. Sizes 7 to 200 cu. ft.

Write Today for Catalog • Prices Quoted on Application

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READING, PENNA.

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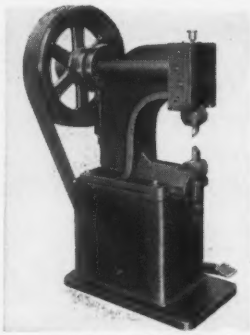

MILWAUKEE-TESSMER
Sprue Cutter
for
Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

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RICE PUMP & MACHINE CO.
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FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

CONSULTANTS

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HIGH SILICA QUARTZITE PEBBLES

★ ★ ★

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Compiled by Ed Bremer, FOUNDRY Metallurgical Editor

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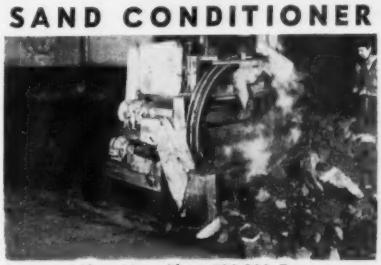

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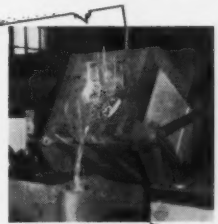

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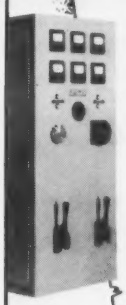

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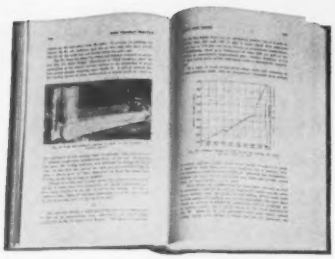

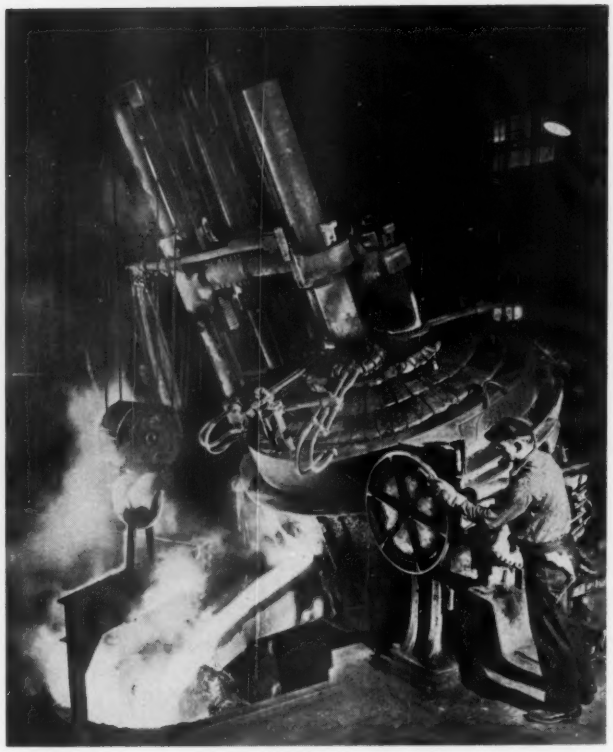

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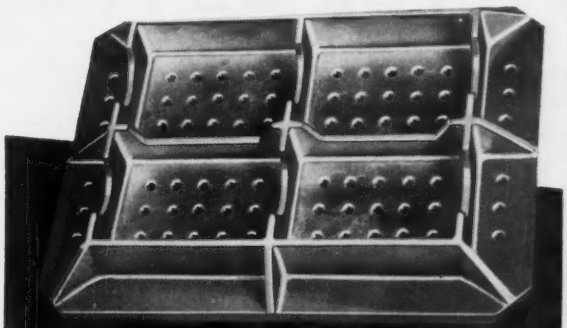

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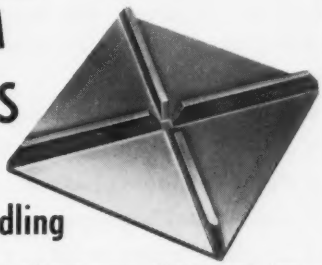

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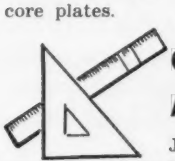

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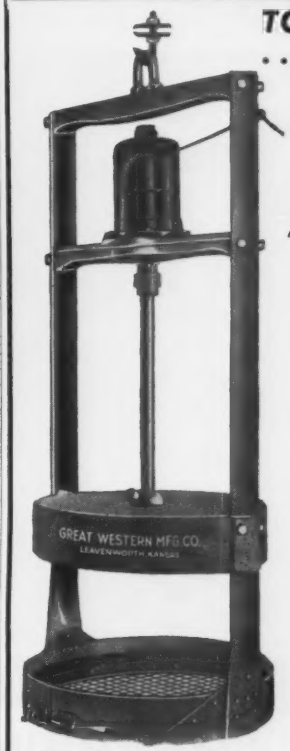

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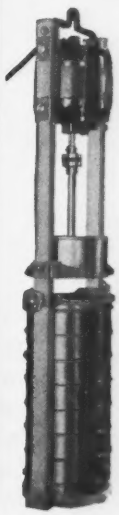

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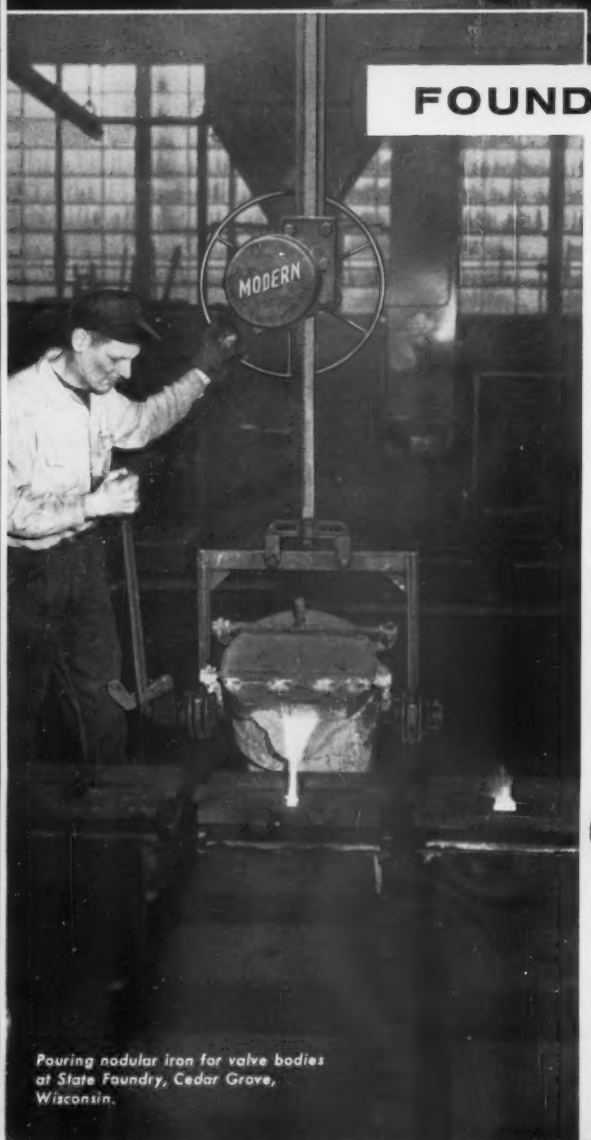

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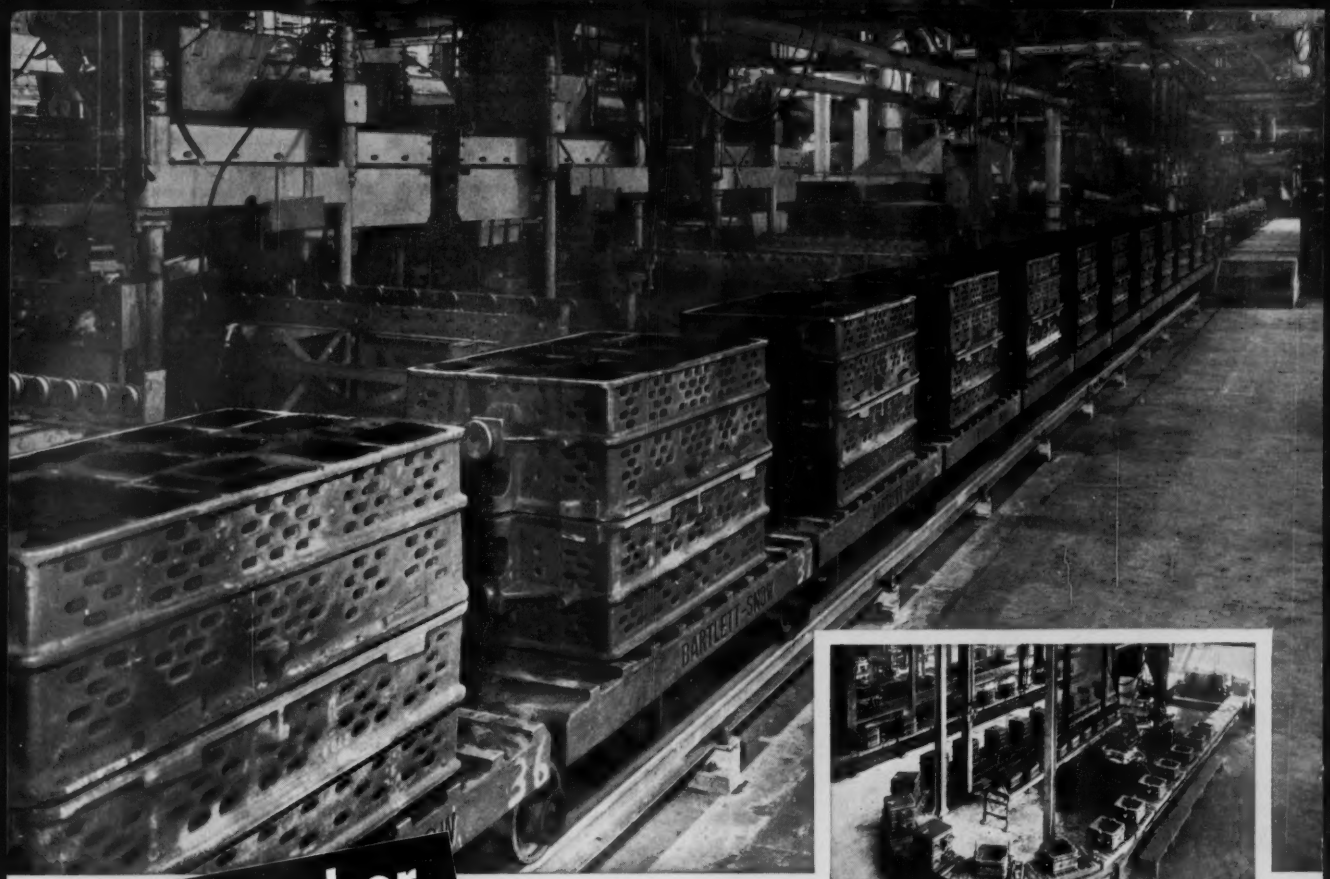
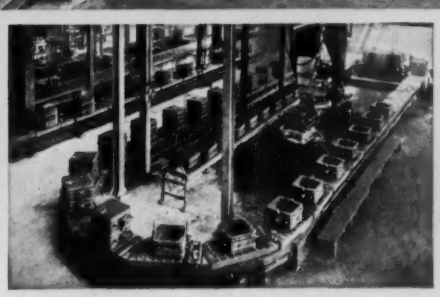
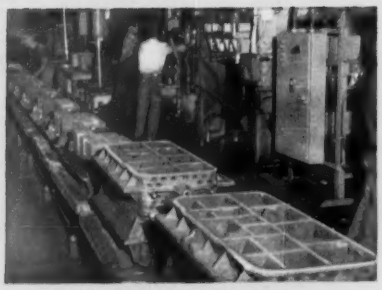
EVERYTHING FOR A FOUNDRY

Circle 552 on Inquiry Card—Page 51

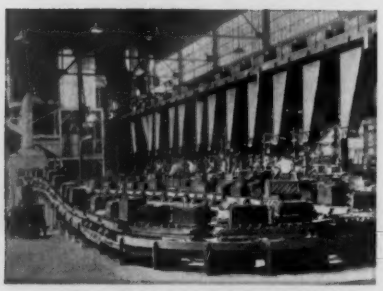




Remember your *Mold Conveyor*



Heavy Duty Mold Conveyor in Large Midwest Foundry.



General View of Mechanized Jobbing Foundry Showing Bartlett-Snow Mold Conveyor with Elevated Shakeout and Self-Dumping Cars.

is the only piece of equipment that handles *All* the core sand, *All* the molding sand, *All* the metal and *All* the flasks in your foundry. It should be of rugged, durable construction.

● Built with heavy, ribbed, overlapping cast iron car tops — large diameter straight faced anti-friction wheels — through shafts connected to heavy duty roller chain that is center guided around the entire loop—and smoothly driven through a variable speed caterpillar drive, Bartlett-Snow floor type mold conveyors are unsurpassed for long, dependable operation. Horizontal or up-and-down designs available — single or double axle type.

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow